ENGINEERING AND MINING JOURNAL

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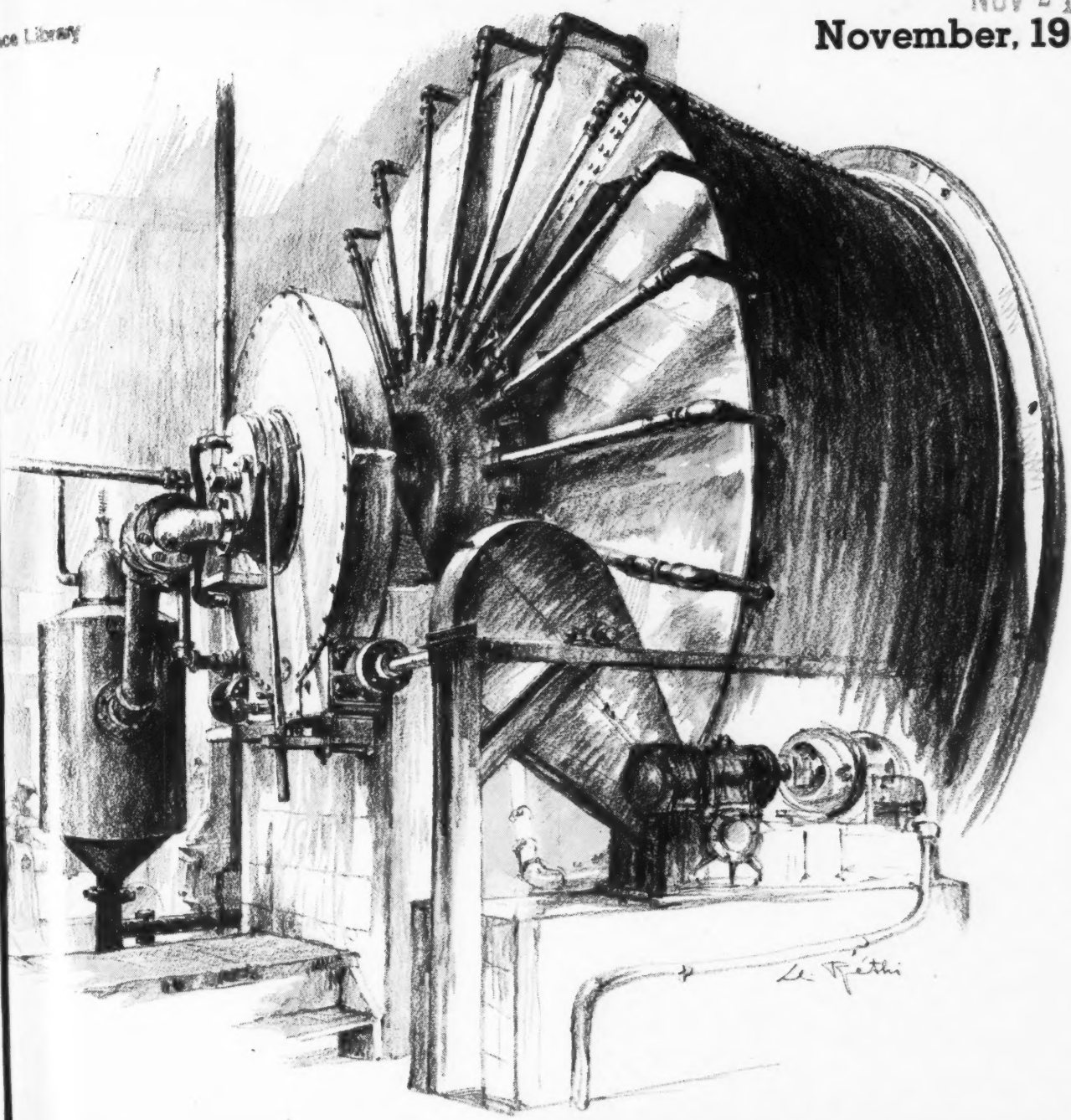
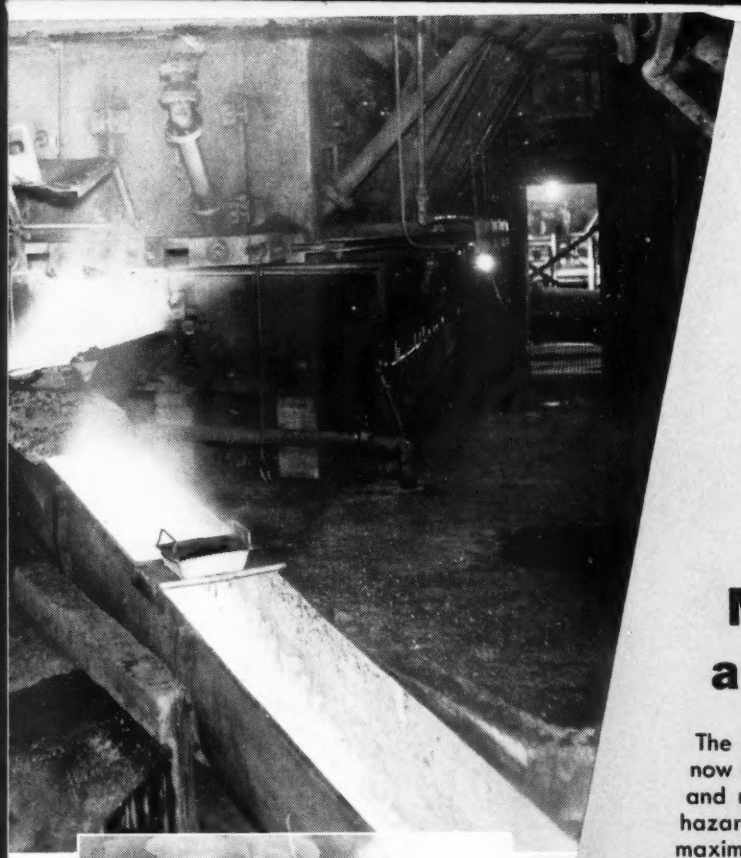
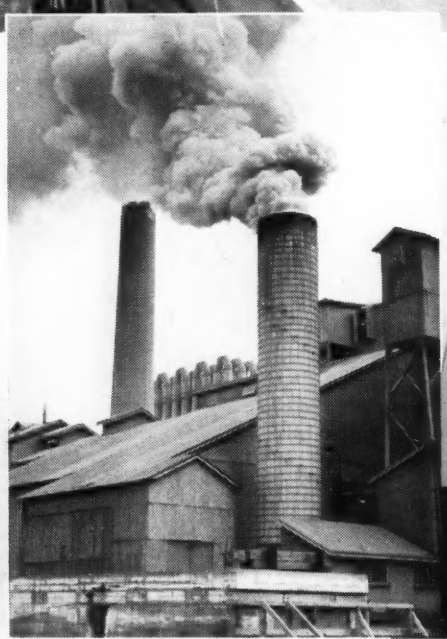
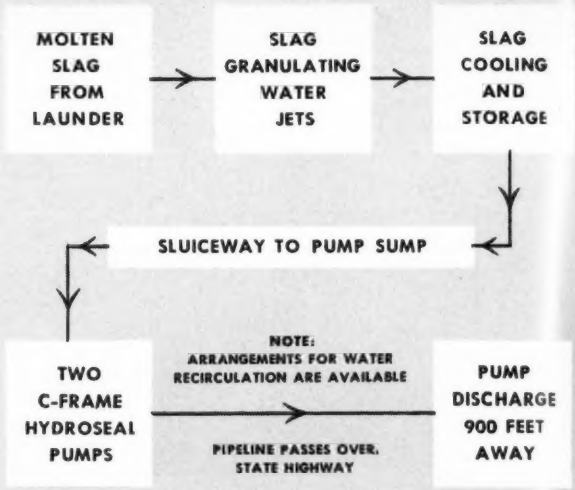


New Prospecting Methods Needed



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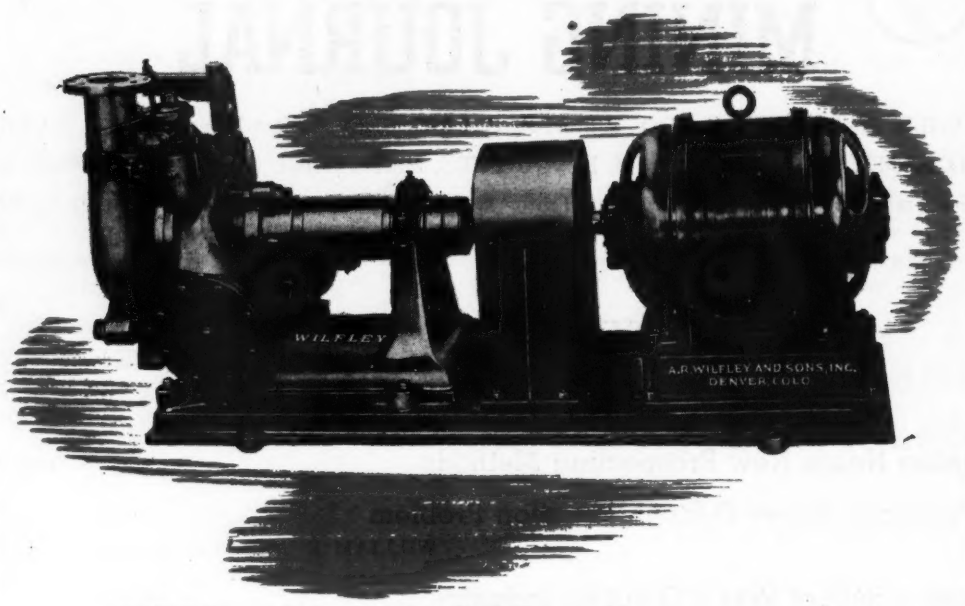

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Evan Just, Editor

Saving Buttons and Losing Shirts

ALTHOUGH the mining industry, by and large, is not inclined to broadcast its views, there can be little doubt that it is one of the great citadels of individualism and free enterprise.

The reason is not difficult to explain. With few exceptions, the mining industry does not attract people whose primary objective is soft living and easy success. Characters that incline toward the rigors of mining are not likely to embrace cradle-to-grave security or pursue the something-for-nothing illusion.

At the present writing it seems likely that we shall have an opportunity to test the measure of our devotion to free enterprise. ***It is in more danger than most of us realize.***

Look around. Russia is communistic and will insist on its neighbors being at least friendly to this pattern of living. China has an important communist element. The United Kingdom is preparing to regiment its entire economic and social system and to strait-jacket trade if these steps seem necessary to bolster its precarious front-rank position. The forces of the left will have at least a balance-of-power postwar status in both the British and Australian parliaments.

Now look at Europe. Every country except Switzerland, Sweden, and Norway has strong leftist blocs. The utter prostration of Italy and Greece and the near prostration of France virtually require strong measures of state control in order to forestall chaos. The growth of leftward influence under these conditions, and the slowness of recovery, are ominous. Can we expect else than stronger etching of the same pattern in countries where the foul talons of the Nazis have slashed deeper into the flesh? And Germany itself, when it is finally battered into submission, will be most exhausted of all. What matter whether the drift under a regimented society be to the right or left? In either case individual initiative is throttled.

In brief, it looks as though, with minor exceptions on both sides, the Western Hemisphere will be a free-enterprise island in a regimented ocean, temporarily at least. How long can such a situation persist?

Virtually all authorities agree that we cannot enjoy more than temporary prosperity in a prostrated world, that speedy recovery will require wholehearted assistance from us, and that we must have a much larger export business in capital goods than ever before in peace time if we are to enjoy domestic prosperity. The stake of the mining industry in general prosperity and a high level of capital goods production is self-evident.

In brief, we are apparently headed for trouble if we do not get the world back on its feet and some measure of free enterprise restored before our backlog of unfilled consumer needs is used up. At stake is not only domestic prosperity but the private-enterprise pattern of living.

The postwar world need for products, including minerals, will be colossal, but, pending rehabilitation, will have to be filled largely on credit or with painful slowness. In the matter of credit, we must realize that sound opportunities are limited by the capacity and willingness of debtors to repay.

The stake of our industry in all this is manifest. What can we do to protect it?

1. We can do our best to afford employment and avoid employer-employee strife.

2. We can lend ourselves to cooperative solution of national and international economic problems.

Let nobody assume that either of these duties can be discharged without cost. Maximum employment may reduce profits. Conciliation may ask a price of both management and labor. Enlargement of exports means corresponding imports, of which a portion will have to be in minerals. We must find a new tariff formula, one that will protect our employment and ever-increasing wage costs and at the same time reduce the average height of the tariff barrier. All of these steps will exact a price, particularly on some groups. Nevertheless, we cannot quibble about buttons when our whole shirt is in danger.

Time is too short to solve these problems by the traditional process of conflict and compromise.

We face a choice of lending a hand to a new pattern of cooperation or of starting down the forbidding road of state control. It is paved at the entrance—smooth going and soft riding. By and by it gets rougher, then rocky—and there is a man on horseback waiting at the end.

Continue Premiums Through Reconversion

THE PREMIUM-QUOTA PLAN was devised to finance the production of copper, lead, and zinc for war without causing the repercussions in the price structure that higher prices would have caused. Despite its unnecessary complexity, despite attempts of some well-meaning administrators to use it in furtherance of their economic theories, and despite many heartbreaking delays and petty injustices, the plan has worked.

Now the economies of copper, lead, and zinc mining are perched on the shoulders of this plan, and both government and industry are wondering what to do about it. Obviously its relaxation will be a shock to these industries, and will curtail production. Probably, with war-inflated wage scales, its complete abandonment would stifle much production that we look upon as normal. On the other hand, it is also obvious that both Congress and the public have no intention of carrying direct subsidies into peace time.

In our opinion, with the possible exception of "C" premiums, it would be unwise to dump the premium-quota plan overboard until the postwar reconversion period is bridged. This refers, not to V-E Day reconversion, but after the Japs have thrown in the sponge.

There are several reasons for this attitude. First, experience with some wartime production programs has demonstrated the extreme difficulty of increasing production after cutbacks have been made. This would be even more difficult in the case of mine production, considering experience in recruiting mine labor during wartime. Second, the cost of premiums is not great compared to other wartime expenditures of government. Third, the idea of stockpiling war-essential minerals as a preparedness measure has universal approval. When the time comes to determine requirements for this purpose, present accumulations, despite their impressive size, are more likely to be short than long. Fourth, even though the longer range outlook is good, both V-E and post-Jap reconversion periods are likely to be difficult times for mining. The acquisition of raw materials is likely to be well down on the list of reconversion tasks facing manufacturers; thus, until the wheels start turning again, mineral markets are bound to be "soft" unless bolstered by government purchasing. Continuance of the premium-quota plan until reconversion is over will be a cheap and constructive way of preventing unemployment in mining areas from contributing to a general down-spiral of confidence in a difficult period.

Texas Tin Smelter Doing Nicely

TIN SUPPLY and consumption during wartime, heretofore hidden from view by the censor, were given a thorough airing at the National Metal Congress on October 17. Erwin Vogelsang, director of the Tin, Lead, and Zinc Division of the War Production Board, presented statistical information at the meeting that showed a higher rate of production and consumption of the critical metal than most observers of the tin industry thought possible.

Our smelter in Texas is producing tin at the rate of 30,000 long tons a year, most of which, despite the mixed character of the concentrate supply, consists of Grade A or Straits quality metal. Consumption of tin in all forms, primary and secondary, exceeds 80,000 tons a year. Our stockpile has been reduced in size, yet totaled around 123,000 tons of metallic tin content at the beginning of July.

Figures on mine production of tin in the United States must have been illuminating to those who insist that commercial tin deposits have been developed in this country. They revealed, for instance, that our mines contributed only 8 tons of tin to the 1943 supply. "Results to date," the head of the tin branch said, "confirm the opinion of experts, to wit: no commercial deposits of tin are known to exist, and the likelihood of ever discovering such deposits appears remote."

Touching on the postwar smelting of tin in this country, Mr. Vogelsang claims rightly that such a development depends upon obtaining a supply of concentrate from producers operating in a highly cartelized field.

Freezing of Surplus Minerals Will Be Permanent

IN THE HOUSE DEBATE that preceded passage of the Surplus Property Act of 1944 Congressman Whittington, an opponent of the Senate-sponsored section on stockpiling, had the following to say:

"The stock-piling section provides . . . for the transfer to the stock pile, but it is significant that there was stricken from the Senate amendment the language which would have made the transfer effective. . . .

"Under the terms of the bill there must be reimbursement for all transfers.

"Under section 22 for stock piling there is no provision for reimbursement. It was omitted. Personally, I insisted upon its omission. The majority of the House conferees insisted upon its omission. Their insistence was based upon the fact that the transfer would not be complete without reimbursement. I repeat that while the Senate amendment would have absolutely frozen, the conference agreement is a partial freeze only for the 12 months when Congress takes no action, with 6 months' provision for the civilian population, and with provision for disposal after 12 months, with no congressional action, as if the alleged stock-piling section had not been included in the bill."

In studying the bill we cannot see that Congressman Whittington has made a valid point. With the Senate provision prescribing a specific means of payment deleted, the general provision for reimbursement applies. This contemplates that Treasury Procurement shall pay Metals Reserve for any minerals declared surplus and transferred to the Treasury. If Treasury Procurement lacks funds earmarked for this purpose, Sec. 31 (c) of the Act provides as follows:

"There are authorized to be appropriated such sums as may be necessary or appropriate for administering the provisions of this Act."

In short, we see no basis for departing from our original interpretation (E.&M.J., Oct., pp. 79, 116) that listed minerals declared surplus within a 12- to 15-months period will become subject without qualification to the stockpile act of June 7, 1939.

MILLING AROUND

An interesting aspect of the war-materiel salvage problem was the Army's attempt to determine the salvage value of a bomber. A Liberator was taken down into those components and materials judged most salvagable. Result: 1,000 man-hours of labor expended and not enough salvage value obtained to defray the labor charge.

At the recent convention of the United Mine Workers John Lewis aimed a blast at explosives manufacturers and wound up by shouting, "The time is coming after the war when union men in the coal mines will use no powder or explosive that does not bear the brand of this organization." This refers to Lewis' determination to organize chemical workers into his catch-all District 50. There is dynamite in this postwar plan, no kidding.

Analysts predict that demands of European reconstruction will be so great that we shall have a considerable export business in steel, principally in fabricated form, as European ingot and rolling mill capacity will probably be nearly adequate. A primary problem is to devise a sound financing program—affording digestible terms on the one hand and assurance of ultimate payment on the other.

A French view is that we owe the success of the invasion to the scheme worked out to make artificial harbors and to discharge cargo on beaches. The Germans believed that we could never supply an invasion without established port facilities, and were prepared to defend the French ports stoutly.

There is no unanimity of informed Washington opinion over the chances for survival of the West's new iron and steel operations.

According to the highest authority, WPB expects substantial amounts of minerals to be declared surplus, and thus transferred to the permanent stockpile before the end of war with Japan.

A competent authority sees the airplane of the future as a combination of alloy steel and aluminum—with steel where strength is most important, particularly where fire might cause light-metal construction to fold up.

The need for a sound but unprecedentedly large international financing scheme will not be immediate. Foreign-owned dollar balances total $6 billion and foreign gold holdings total $15 billion.

The Office of the Coordinator of Inter-American Affairs estimates that a market for $268,900,000 worth of mining and petroleum machinery will exist in Latin American countries during the ten years immediately following the war.

Judge John W. Haussermann, leading industrialist of the Philippines, in expressing elation over the invasion of the islands, added that he plans a personal expenditure of $3,000,000 to $5,000,000 "and more if necessary" to restore production at his gold mining and timbering properties. Approximately 400 American employees were interned at the time of the Japanese invasion. To those who manage to survive, Judge Haussermann promised a year's vacation in the United States.

An important figure in international finance sees the essential role of gold as a barometer, the gold position being an indisputable index of a nation's economic health, which might otherwise be less apparent.

Western Mining Needs New Prospecting Methods

J. H. FARRELL, *Consulting Mining Engineer and Geologist, Reno, Nevada*

Mining exploration in the West has steadily declined for some years because our supply of metals has been quite satisfactory and the large mining companies have not been greatly interested in finding new mines. There are promising fields for systematic work, which should be the business of the established concerns now making money from mines, because the costs and the problems involved are too great for individual prospecting. Geological and engineering skill, plus more money spent on actual development in likely areas, will find the mines of the future.

WITHOUT IMPORTANT DISCOVERIES in the West, and with many of the big mines having greatly depleted reserves, it will be impossible to maintain domestic production of the non-ferrous metals for more than comparatively few years at anything like the normal rate.

There is nothing new in the statement that there has been insufficient exploration and development in the West for a good many years—in fact, since the opening of the "porphyry" or "disseminated" copper deposits between thirty and forty years ago. These were nearly all developed in districts where there had been some previous mining, enough in most cases to prove the existence of orebodies which in early days were considered too low grade to work. The writer does not know of any important porphyry deposit that was drilled solely on account of outcrop showings. However that may be, the fact remains that only a small number of such deposits were found. One reason why more have not been discovered, undoubtedly, is that surface indications of disseminated sulphide mineralization are not likely to interest the average prospector. Unless he could find a vein good enough to work somewhere in the area, he could not get very far with development.

An old-timer at Ray, Ariz., asked confidentially if there was really a mine there. He said he saw all those churn drills working all over the hills, but very little ore mineral coming out. In his opinion it was just another stock-jobbing scheme. Such a prospector would not be likely to pay much attention to a disseminated deposit.

Looking for such deposits is a geologist's job. When he has found an area with promising indications, his judgment must be backed up by drilling or shaft sinking to see if there is a workable zone of secondary enrichment, unless the surface zone is rich enough. Even if these conditions are found, extensive exploration is required to prove a big orebody. The geologist cannot do much more than the prospector without backing. That brings us to the really important point: the search for such deposits is a big-company job. For a good many years the big companies would not do it, but recently they have shown more interest in undertaking development if geologists like the available evidence.

There are undoubtedly several areas in the West where such work would be warranted. However, it must be said here that it is rather unlikely that any exceptionally attractive showings will be found. It will probably be necessary to do work on outcrops which have been turned down by many field engineers in the past three decades. For example, in one locality which the writer examined there is a small area of typical disseminated mineralization where the primary sulphides are in sufficient quantity to make ore, but the showing was thought too limited, and although some drilling was done, the prospecting was by no means complete. The ore-bearing formation, monzonite porphyry, shows only as a relatively small exposure in a gulch bottom, the surrounding slopes being covered to a considerable extent by later volcanic flows in one direction. Elsewhere in the area there are sedimentary formations showing some copper mineralization, which may be evidence of an extension of the ore-bearing monzonite in that direction. Here it would be necessary to plan a drilling campaign based on the chance that extensive bodies of ore similar to the limited one now exposed are to be found in the area.

Copper in California

Because the "porphyries" have dominated the domestic situation, yielding cheap copper in any quantity required, they have removed the incentive for exploration for other deposits, and have conditioned much of the thinking about future supplies of the metal. Consequently we may be paying too much attention to this particular type of orebody. When asked "Where are the best chances of finding them?" the writer often mentions the California Foothill Copper district, sometimes called

the West Belt (of the Mother Lode), and usually the questioner says he never heard of it. If anyone is curious, let him get out the folios of the U. S. Geological Survey covering the Mother Lode district and look at the general geology of the country five to ten miles west of the Mother Lode itself. Note the great masses of igneous rocks and the long bands of the schist formations and highly metamorphosed sedimentaries. The area has been left entirely to haphazard, small-scale operations. To be sure, the Penn mine, near Campo Seco, was worked to a depth of more than 2,500 ft. on a 100- to 150-ton a day basis. The property at Copperopolis was mined to 1,600 ft., or deeper, on a somewhat larger scale. Neither of these mines was of interest to the larger companies.

It may be noted that in some of the known deposits of the West Belt zinc exceeds copper; for example, the Penn average of ore in sight was, approximately, 4 percent copper, 9 percent zinc, and $3.50 per ton in gold and silver (at present prices). This ore can readily be treated by flotation, with satisfactory separation of zinc and copper minerals. The important facts about the district, which is roughly parallel to the Mother Lode zone for 75 miles or more, are that it shows evidence of strong mineralization in many places and that between the known ore deposits are surface indications which have not been adequately prospected because the outcrops show little or no ore to attract prospector or leaser. It is a field requiring systematic and well-financed exploration such as can be done only by a strong exploration company. Such an organization might be financed by one or more of our big mining and smelting concerns, following the methods of the large British companies in cooperative investigation.

Methods for the West

The mining industry of the West cannot maintain itself without adopting more active exploration policies. It may be asked, "What can be done to better the situation?" The answer is that adequately financed companies must undertake the necessary field work of re-examining known districts and trying to find new ones. Their engineers must be encouraged to go to work on projects which require drilling or underground work to prove them. The field engineer must not be made to feel that his job will be in danger if many of the things he tries out fail to make mines; on the contrary, he must be taught that if he does not do a minimum amount of actual digging he will never find a mine. This does not mean that the young men are to go out and spend money on everything in sight, but it does mean that the method of covering thousands of miles on "field trips" by automobile, spending an hour or so looking at a mine or prospect in one district, and then dashing off to another, should be abandoned.

For an example of real mining exploration we may look at the methods adopted in the iron mining districts of northern Michigan, which were applied in part in the discovery of some of the Canadian gold mines. After the outcropping orebodies had been found in the Iron Country it was no longer possible for prospectors or small operators to find mines; so the larger operating companies made it a part of their business to look for new ones. The limits of the districts, or iron-bearing formations, were determined by geological surveys, the general work being done by government geologists, and the details by company men. The companies would then buy or lease tracts of land and carry on more or less extensive campaigns of core drilling. If ore was found, intensive drilling was carried on to prove limits and possible tonnage preparatory to shaft sinking and mine development. My first mining experience was in this field, and upon coming West it was surprising to find that no comparable exploration work was being done aside from the drilling of the porphyry copper deposits, which was active and productive at that time.

It may be argued that the Michigan iron deposits are particularly well adapted to such methods; that when one of them is found it may make a big mine which will pay for

IT TOOK GEOLOGY, ENGINEERING, AND MONEY TO PROVE THIS MINE

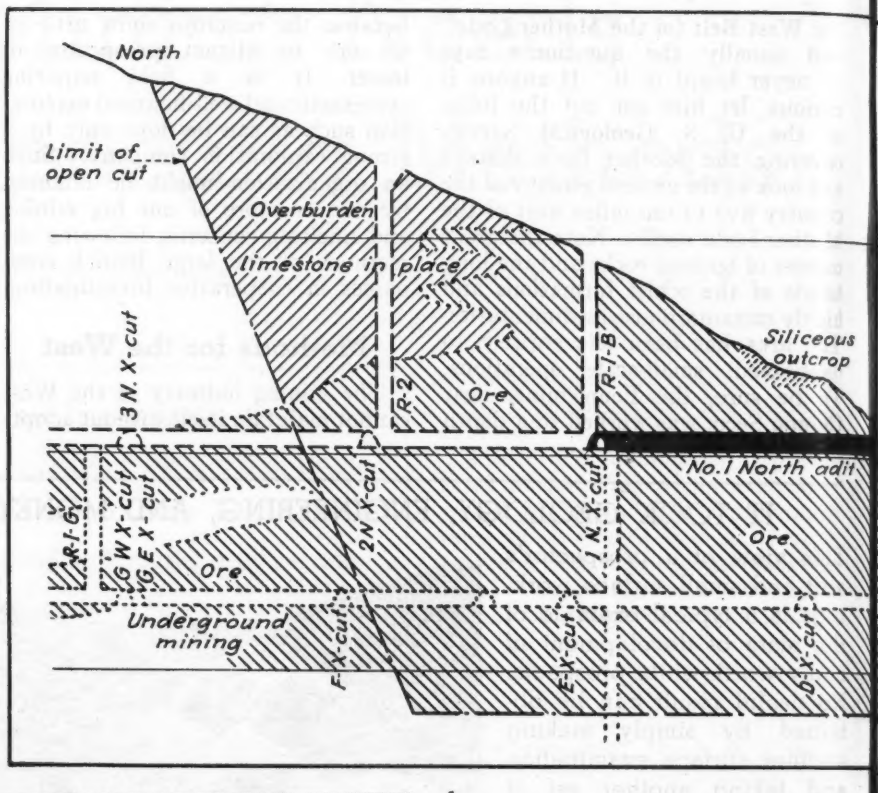
This view of a prospector's adit and small surface workings is a typical example of the state of development of many worth-while prospects. No useful result can be obtained by simply making another surface examination and taking another set of samples unless the interested parties are willing to undertake further development. In this case, the suggested development and the results are illustrated on the following page. This photo is looking up the slope to the left from the low point in the middle of the section.

★ ★ ★ ★

★ ★ ★ ★

When the initially recommended development indicated was performed, including crosscuts at 100-ft. intervals, it proved an orebody of at least 100 to 150-ft. width and 400-ft. length. The added development shown proved 800,000 tons of ore and provided access and workings necessary to start mining. Costs to this point were 10c. per ton.

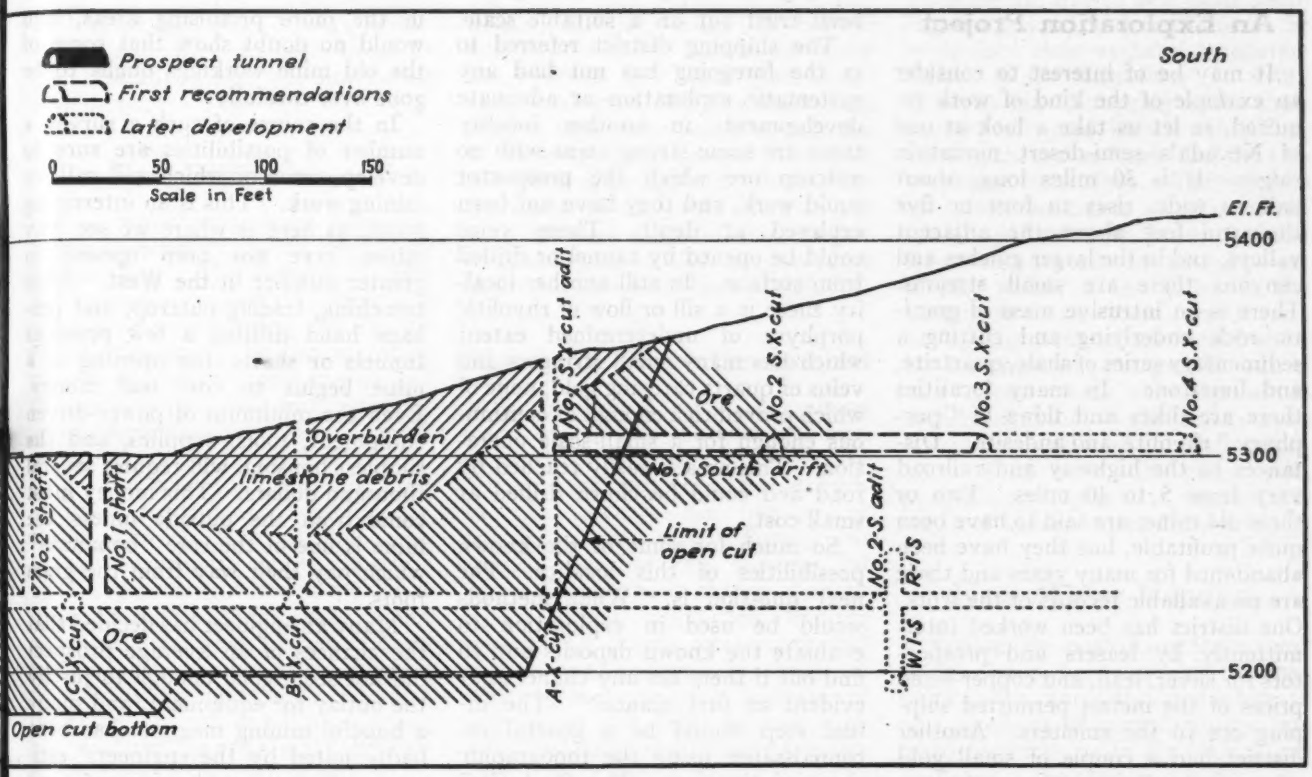
The view below is looking to the right from the low point in the section. The dump in the foreground is at No. 1 South Adit, a short crosscut to and across the ore zone which was explored by a drift extending toward the dumps at upper left. There was no surface indication of ore in this direction, and the dimensions of the orebody were never fully explored underground. The foreground and most of the lower left area were included in the open cut.



a lot of exploration. That is true enough, but it is not true that similar methods of systematic search would fail in the Western districts. Most of these areas are hilly to mountainous country, in which much more can be discerned by initial geological work than in Michigan and Ontario, where much of the surface is swamp land or glacial drift. Often it is possible in the West to localize problems, investigation of which will greatly lessen the drilling required. For example, if there is a big vein which is barren or low grade on outcrop, what will it show at 200 or 500 feet in depth? A few holes drilled from surface will tell if it is worth while to sink a shaft. The drilling would total about the footage of two prospect holes on a Michigan property, which would require ten times that number in the initial stages of the work.

Exploration in the Western districts can often be done by relatively inexpensive tunnel work. As an example, a few years ago the writer examined an old prospect tunnel about 150 ft. long with a 40-ft crosscut. These workings were found to be entirely in gold-bearing material, which might be profitably worked at the increased price of the metal if the orebody could be proved large enough. Extension of the tunnel to the north with crosscuts at 100-ft. intervals soon proved a width of 100 to 150 ft. and length of 400 ft. at least in that direction; the extension to the south was explored by a couple of shallow shafts, a short crosscut, and a drift with crosscuts, which indicated an additional length of 500 ft. and widths of 50 ft or more. With another tunnel 75 ft. lower and raises to surface it was possible to estimate 800,000 tons of ore, which had been developed with a portable compressor and the usual prospecting equipment at a cost of about 10¢. per ton. Mining could be done by open cut and the ore was amenable to cyanidation without fine grinding; thus costs were very low.

This work cost about $80,000, including equipment, which was mostly second hand, and housing which was by no means elaborate. Roughly a third of the expenditure for development was on the initial recommendations which covered work sufficient to prove an ore deposit of workable dimensions and grade. The orebody could have been blocked out by churn drilling at considerably lower cost, but because of the low gold content of the ore, the sampling might have been questionable. Also,



it was evident at an early stage of the preliminary work that the north-end ore would have to be mined underground, and the lower level was driven with this in mind. It would have made available at the start of operations ore of about twice the average grade, which would have greatly increased the mill output. Unfortunately, the management of the company operating the mine failed to carry out the underground mining and the ore was not reached by the open-cut work.

This is only an example of a minor exploration project such as could be carried out with limited funds. There are plenty of such opportunities, and better ones, in the West, but they require actual work to prove them. Until recently the method of the so-called "exploration departments" of most of the big companies has been to maintain city offices and wait for promoters or mine owners to come to them with "definite projects." Most of these were turned down in the office. Occasionally a field engineer might be sent to sample, but he rarely did any digging.

Neglected Western Areas

In addition to the many formerly productive districts now abandoned or inactive are regions which have not been productive because of inadequate exploration, or physical and metallurgical difficulties. Some early discoveries resulted in the establishment of small towns or "camps," which are now almost forgotten or are merely names on the map—not even "ghost towns." They did not pan out because they were too far from railroad transportation, or the ore was not amenable to treatment by the processes then in use. Such a region is the Sierra Nevada range east of the Mother Lode, and particularly the eastern approaches to the main ridges.

The writer does not imply that the Sierra Nevada region will yield finds of importance equal to those in Ontario, but would call attention to the fact that the early idea of a great barren granitic core must be considerably modified in view of what we now know about the general geology of the area. Marginal to the central intrusive mass are mineral-bearing granites and granodiorites, as at Grass Valley, and along the "East Belt" as at West Point and Confidence. The Engels copper mine is in a strongly mineralized zone in granodiorite marginal to the central core. A similar marginal zone is found to the east and there are also numerous roof pendants of sedimentary formations surrounded by the granite. Great masses of later volcanics are found at many localities. A few ore deposits have been worked in these various formations, but exploration since the early pioneer days has been quite limited.

In California, Nevada, and Arizona are some limestone areas which have not had anything like the prospecting given to similar formations in Mexico, which were originally developed by peon labor for native owners and later acquired by foreign operators. Typical of such districts is Cerro Gordo, Calif., which has produced considerable amounts of lead, silver, and zinc, but which has never been systematically explored. Looking for ore in limestone formations usually requires a willingness to dig on minor outcrop showings, and to follow seemingly insignificant veins or stringers. Geophysical methods may prove useful in some places.

Other general exploration opportunities might be mentioned, such as those in the isolated desert hills and ridges discussed in a succeeding paragraph, or in the heavily timbered or brush-covered mountains of northern California and the northwestern states; or in certain localities where volcanic flows, gravel beds, or lake bed deposits obscure the productive formations. However, there is no reason for going into more detail here, as enough has been said to suggest that ample opportunity for systematic prospecting exists. The problem is rather in obtaining the backing for such work, due both to the necessity of spending real money and the difficulty of "selling" the idea to the men who control much of Western mining at the present.

(Continued on next page)

An Exploration Project

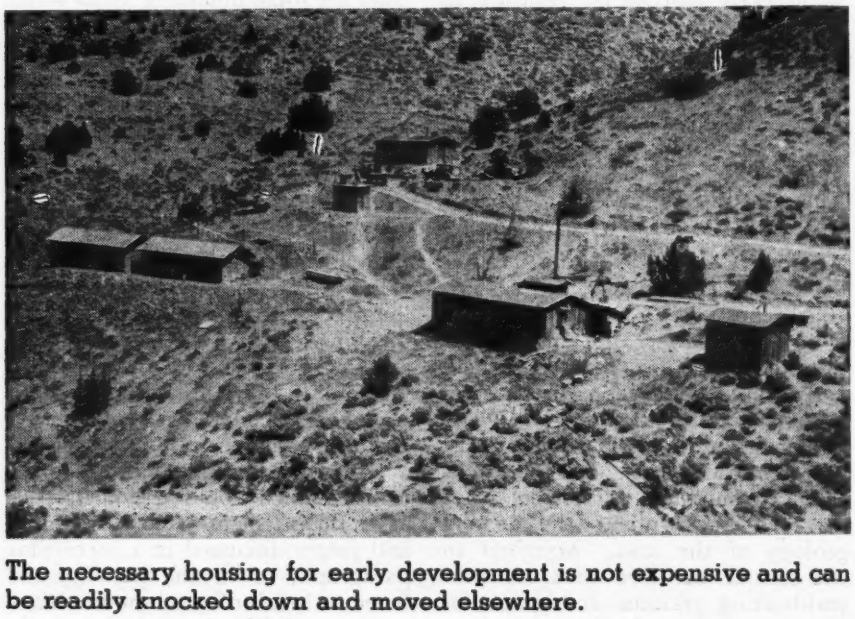
It may be of interest to consider an example of the kind of work required, so let us take a look at one of Nevada's semi-desert mountain ridges. It is 30 miles long, about half as wide, rises to four or five thousand feet above the adjacent valleys, and in the larger gulches and canyons there are small streams. There is an intrusive mass of granitic rock underlying and cutting a sedimentary series of shale, quartzite, and limestone. In many localities there are dikes and flows of "porphyry," rhyolite, and andesite. Distances to the highway and railroad vary from 5 to 40 miles. Two or three old mines are said to have been quite profitable, but they have been abandoned for many years and there are no available records of the work. One district has been worked intermittently by leasers and prospectors for silver, lead, and copper when prices of the metals permitted shipping ore to the smelters. Another district had a couple of small gold mines, and a few mercury and tungsten deposits have been worked on a small scale. Taken as a whole this area has everything that it takes to make ore deposits, yet a big mine has not so far been found in the region. The pessimist says that if there had been such a deposit it would have been found long ago, for big mines have a way of promoting their own development, as at Virginia City and Tonopah. However, in spite of a favorable history of only small orebodies, and lack of important discoveries to date, there are promising chances that have not been tried out on a suitable scale.

The shipping district referred to in the foregoing has not had any systematic exploration or adequate development; in another locality there are some strong veins with no outcrop ore which the prospector could work, and they have not been explored at depth. These veins could be opened by tunnel or drilled from surface. In still another locality there is a sill or flow of rhyolitic porphyry of undetermined extent which has many small stringers and veins of quartz carrying gold, none of which proved rich enough or continuous enough for a small-scale operation. This area is easily reached by road and could be churn drilled at small cost.

So much for some of the known possibilities of this locality. The next question is, "What methods would be used in exploration to evaluate the known deposits and to find out if there are any chances not evident at first glance?" The initial step should be a general reconnaissance using the topographic sheet of the area. The Geological Survey has done no areal geology. This would be a job for an experienced field geologist and a couple of competent assistants, all of whom should have had some training in mining geology and the examination of prospects. It need not be a very detailed survey, as its object would be to get a general idea of the character and distribution of the various formations and the relation to them of the various known ore deposits. Such work would indicate where to look and what to do next, would point to the need for detailed work in the more promising areas, and would no doubt show that some of the old mine workings ought to be gone over carefully.

In the course of such a survey a number of possibilities are sure to develop, some of which will call for mining work. This is an interesting point, as here is where we see why mines have not been opened in greater number in the West. After trenching, tracing outcrop, and perhaps hand drilling a few prospect tunnels or shafts, the opening of a mine begins to cost real money. Even the minimum of power-driven equipment, tools, supplies, and the simplest housing, will require several thousand dollars. This money must come from the outside unless the mine is one of the rare "bonanzas" which pay their way from the grass roots.

Many an engineer has decided that the chances of an average prospect did not seem good enough to justify the outlay for equipment, and many a hopeful mining magnate has been badly jolted by the engineers' estimate of cost of equipment and underground work. There is also the consideration that if you put up the several thousand dollars required for machinery and the venture does not pan out, you will get only junk prices for what is left. The result has been that the prospector trying to open a mine may struggle along for years doing hard work if the ground is not too hard, hoping that slowly and with sacrifice he may get together the tools for more effective work.



The necessary housing for early development is not expensive and can be readily knocked down and moved elsewhere.

Necessary Equipment

Here the proposed type of exploration company would have a great advantage. Once the geologist has decided on a specific piece of work, the field superintendent or foreman would move the necessary equipment to the job. This is about like a road-building contractor's outfit, including the useful "cat" but barring the heavy dirt-moving machinery. It will include a semi-portable air compressor. There will be air drills, air-driven hoist and pump, blacksmith shop equipment, tools, etc., trucks, including a water carrier; tanks, portable houses strongly built and well insulated. In a short time the work can be begun and carried quickly to a decisive point. The property is then ready for the operating department, if the initial work has been successful. The equipment is available for the next job in the vicinity instead of being for sale as

junk. In this way initial expenses are low for each piece of work undertaken, and the engineer need be less hesitant about recommending development.

Past Difficulties

A question sometimes asked is, "How thoroughly has the West been prospected?" The answer is that it has had a remarkably complete going over, considering the knowledge and means at the disposal of the pioneer prospector. He was limited to some extent by water supply when dependent on animal transportation in the more arid places. Later he was confined near the available roads when traveling by automobile. It is a difficult task to take the ordinary car or light truck up a sagebrush-covered slope, or a steep sand and gravel wash where no track has been broken. Some low-geared trucks have been used to get off the old roads and trails, but the actual amount of hill prospecting has declined sharply with the disappearance of the "burro man."

There are still many isolated hills and desert ridges away from roads and water holes which have not been carefully looked over, if at all. Such a hill stands only half a mile or so from a good road in the southwest part of the Mojave district in California. People had been passing that way for a good many years without taking the trouble to prospect that hill, but during the boom following the discovery of the Golden Queen vein the district was given an intensive prospecting and a small bonanza gold deposit was found on Middle Butte. The Kramer Hill gold deposits, in San Bernardino County, Calif., were found only two or three miles from the railroad and a road which had been used for a long time. Randsburg, Calif., was only seven or eight miles from one of the main roads of the period before its discovery. Tonopah, Nev., was put on the map by a man who was making a detour from the main road, traveling with team and wagon to one of the older camps. It is unlikely that either Tonopah or Randsburg would have been found by automobile prospectors.

All of the places mentioned are in the desert region, where water was scarce in early days and where you can travel present highways and see hills and ridges from two to twenty miles away standing like islands in a great lake. No roads lead to them, and they must have looked even farther away to the prospector moving slowly with burros or team and wagon, carrying water for himself and his animals. Doubtless there are minerals in "them thar hills," and discoveries will be made from time to time when people get around to looking them over. However, the intervals between discoveries are likely to be longer than in the past, because most of the obvious outcrops—and a lot of the more obscure ones—have been found.

Men and New Equipment

An important factor in mining discovery is the number of men engaged in prospecting, especially if the old methods are to be followed. In recent years the number of prospectors has very definitely decreased, because the business no longer offered much chance of making a living much less sudden wealth. Of course, after every war of the past, particularly the Civil War, there was some increase of activity in this field, because men had been taken out of their familiar environment and found it difficult to settle down again. Perhaps that will happen after this war, and we shall see jeeps and halftracks exploring ridges of isolated areas.

The writer would prefer the helicopter, which will be much quicker and more efficient than anything else in the field. Here, we again get back to the exploration company idea, as helicopters are going to be rather expensive. The advantages are quite evident: high speed compared to cars; no road problems; aërial views, distant or closed up, for photography; the ability to cruise close to the surface in calm weather for preliminary inspection of new areas; and to land and pick up field men and light equipment working within a radius of 50 to 100 miles from headquarters conveniently situated.

Although photographic methods of mapping have not had much use in the West, the tremendous advance in airplane photography made during the war will no doubt lead to a wider use of this facility. Airplane surveys often show locations of important contacts or the trend of mineralized zones, especially where differences of vegetation characterize some of the formations. It is probable that the recent developments in color photography in connection with airplane mapping may increase the value of such work when the technique and operatives are released by the armed services. For example, some areas of disseminated mineralization have a distinct reddish tinge when viewed from the air, due to iron oxide staining too general and too faint to be recognized close at hand as characteristic of the formation. In many localities old hot spring zones show yellow, red, and brown coloration, making them stand out from the surrounding formations. These zones are often indicators of mineralized areas, though they rarely contain important deposits of ore. For example, within a few miles of the Comstock Lode there are several hot-spring areas which would show up on airplane photographs. In a new country such showings would attract attention to the locality even if vein outcrops were not distinguishable. Such work, like geophysical prospecting, calls for systematic study of known mineral districts.

New Mines Needed

Apparently most of our large companies have been too much concerned with consolidation of interests and problems of manufacturing finished products, as in the fabrication branches of the copper industry. At any rate they seem to have lost sight of the fact that mining and smelting depend fundamentally on ore reserves. In a recent article in *Engineering and Mining Journal*, Raymond Brooks mentioned the fact that the leading copper groups of this country evinced little interest in the very important African discoveries and developments with which he was connected. He seemed at a loss to understand it, but that attitude was not new in our mining history. It is a matter of record that most of the great Canadian gold districts were developed with little help from American mining companies. In a still earlier period in mining in this country there were a number of profitable mines in California (the Mother Lode and Grass Valley properties) and in Nevada (notably the Comstock group, the Tonopah and Goldfield mines) whose owners either made little effort or had little success in perpetuating their business by finding new mines.

Perhaps the stage has been reached where it will require strong capital with new ideas and initiative to keep the West in the mining business. In any event, one factor will certainly be of major influence and importance, and that is the well known law of supply and demand. The next several years are likely to see the stimulation of increasing demand and diminishing domestic supply, and we must have the metals either from our own mines or from abroad.

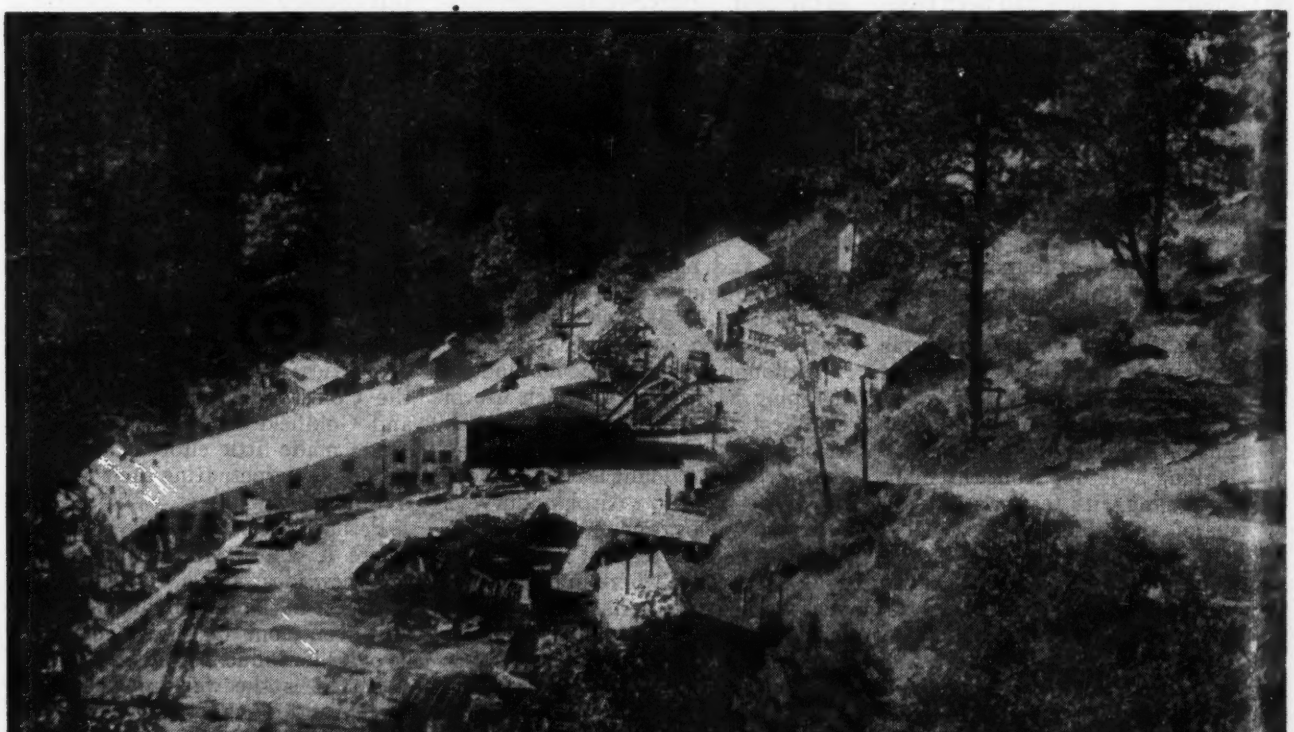
California Producer Solves Difficult Flotation Problem

Metallurgists accomplish intricate separation of chalcocite and sphalerite by carefully controlled reagent feeding and intensified conditioning.

WILLIAM E. MESSNER, *Superintendent, and* **HUGH H. BEIN,** *Geologist and Metallurgist, Big Bend Mine Hoefling Brothers Oroville. Calif.*

In October, 1942, Hoefling Brothers, owners and operators of the Surcease gold mine, became interested in an adjoining prospective base-metal property now known as the Big Bend mine. The property is about 25 miles northeast of Oroville, in the Big Bend area of the Feather River Canyon. It was acquired under lease from E. F. Allingham at a time when gold mine closing was ordered by WPB Order L-208. Hoefling Brothers' mining organization had been operating and developing their Surcease property since 1933, and a completely modern 125-ton flotation-cyanidation mill and surface plant were constructed late in 1940. Equipment, therefore, was virtually complete for any underground mining operation that would fit into the war production scheme. The Big Bend mine is about five miles from the Surcease plant, and its proximity to the latter made development of the zinc and copper prospect more desirable and enhanced the possibilities of a successful operation if a mine were developed.

Notable in the development of the Big Bend mine is the fact that, unlike most other California West Belt properties, no previous zinc or copper production has been recorded from either this property or the area in which it lies. At he start of development an old 100-ft. adit with a 10-ft. winze and a 50-ft. shaft to the surface were the entire workings. The adit had been run on the gossan outcropping years ago by gold prospectors, and the shaft was raised through to the surface by the present owner. About 12 in. of high-grade zinc and copper ore were showing in the winze bottom. Above that horizon, leaching of the



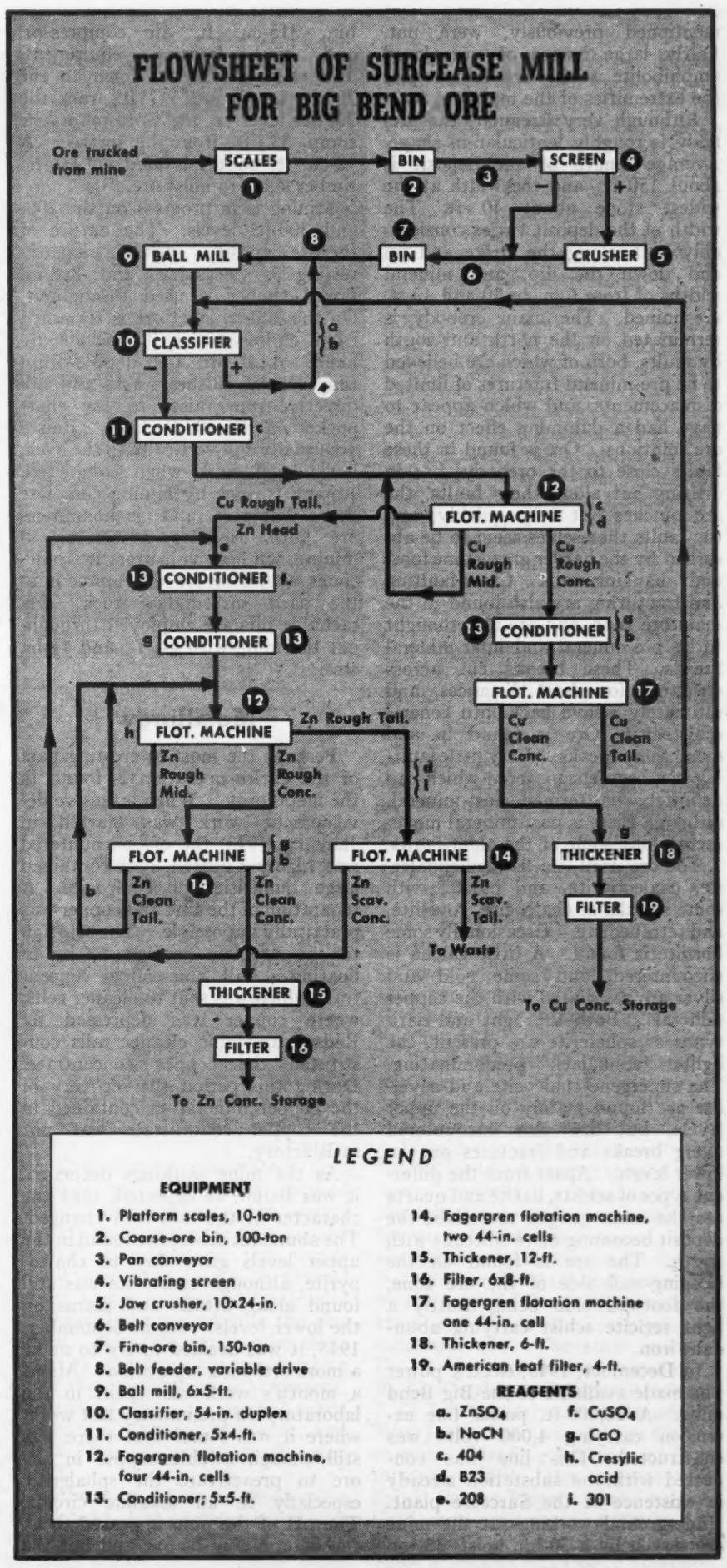
Surcease mill formerly treated gold ore; now concentrates zinc-copper ore from Big Bend mine.

copper and zinc minerals left no ore available for mining.

In the early development and through a period of actual mining, electric power was not available, and all units were powered by air furnished by a 315-cu. ft. diesel compressor. Many difficulties were encountered during the first winter of operation, the principal one being adverse road conditions. At an elevation of 2,600 ft., little snow is encountered, but a rainfall of 80 to 100 in. annually is common. The roads were little more than wagon trails, and for periods during the winter miners were transported from the Surcease mine to the Big Bend by tractor. In April and May, 1943, the roads were improved with rock surfacing, and movement of ore was started by truck to the Surcease mill late in May. The first shipment of zinc concentrates was sent to the Sullivan Zinc plant, Kellogg, Idaho, early in June, 1943. With rearrangement of some units, equipment installed at the Surcease mill was sufficient for early production and mill test work. Separation of the zinc and copper minerals by flotation was practically impossible on ore mined above the 100-ft. level, and only a small amount of copper concentrate was produced from this ore.

Geology

The Big Bend mine lies in the district covered by the U.S.G.S. Bidwell Bar folio originally mapped by Becker, Turner, and Lindgren in 1887. Since then little or no geological work has been done in the Big Bend area by any of the government agencies, and only a small amount by private companies. The ore occurs in chlorite and sericite schists, which, although having varied local strikes and dips, have an average strike of N. 40 deg. W. and dip about 80 deg. to the NE. These schists lie in massive and schistose amphibolites locally called "greenstones." Highly folded dikes are found in the ore zone and are believed to be pre-mineral and intermineral intrusions. See illustration. The ore is a typical banded schistose deposit which has replaced the original sericite and chlorite schists, from both of which it inherits its schistose structure. Very little crushing or distortion is found in the ore minerals. Apparently several types of rock were involved when the original schists were formed, some of which were amenable to replacement by the ore-bearing solutions. Other types, like the dikes



mentioned previously, were not. Fairly large horses of unreplaced amphibolite schist are found near the extremities of the main ore zone.

Although very irregular, the orebody is roughly lenticular in shape. Average length of the deposit is about 150 ft., and the width at the widest stope about 40 ft. The width of the deposit varies considerably both along the strike and up and down the dip, and mineral widths of from 6 in. to 30 and 40 ft. are mined. The main orebody is terminated on the north and south by faults, both of which are believed to be pre-mineral fractures of limited displacements, and which appear to have had a damming effect on the ore solutions. Ore is found in these faults close to the orebody; but in drifting out along these faults, the ore pinches out very quickly, and the faults themselves seem to be absorbed by the harder greenstone foot- and hanging-walls. Cross-faulting and fracturing are also found in the main ore zone, and are also thought to be pre-mineral and inter-mineral breaks. These breaks cut across structure for short distances, and ultimately weave back into general schistocity. Ore is found in and along these breaks. Very little faulting has been encountered which can definitely be termed post-mineral, although there is post-mineral movement along some of the older faults.

The ore itself is a banded sphalerite, chalcopyrite, and pyrite, with some streaks of chalcocite, covellite, and tetrahedrite. Occasionally some bornite is found. A little galena is encountered, and some gold and silver are associated with the copper minerals. Both the light and dark types of sphalerite are present, the lighter "resin jack" predominating. The supergene chalcocite and covellite are found mainly on the upper levels, but are also encountered along breaks and fractures on the lower levels. Apart from the different types of schists, barite and quartz are the main gangue materials, the deposit becoming more siliceous with depth. The ore is found on the hanging-wall side of the ore zone, the footwall side being mostly a light sericite schist carrying abundant iron.

In December, 1943, electric power was made available to the Big Bend mine. A 10,000-ft. power line extension carrying 4,000 volts was constructed. This line was connected with the substation already in existence at the Surcease plant. Underground workings at the mine are served by a 30-hp. hoist, 35-ton bin, 315-cu. ft. air compressor, and timber-framing equipment. The shaft is 4x6 ft. down to the 200-ft. level, and 5x7 ft. from the 200-ft. level to the bottom of the sump, 330 ft. from the surface. A 12-cu. ft. bucket is used on 4x6-in. timber skids to hoist ore.

Mining is in progress on the 200- and 300-ft. levels. The nature of the ore deposit is such that square-setting is necessary, and 8x8-in. sawed timber is used throughout. On the 200-ft. level ore is trammed from chutes to shaft pockets by hand. A 10-hp. I-R double-drum tugger hoist slushes waste and ore directly from raises to the shaft pocket on the 300-ft. level. Raises are usually run vertically to the overlying level, and, when completed, stoping is done by mining complete floors. Stopers and jackhammers are both used to advantage in mining, but heavier drifters are sometimes necessary for development in the hard surrounding rock. Detachable bits are employed throughout the mine with $\frac{7}{8}$-, 1-, and $1\frac{1}{8}$-in. steel.

Metallurgy

Perhaps the most interesting part of the entire operation is found in the metallurgy. When intensive development work was started in January, 1943, the ore encountered was highly oxidized, and contained large quantities of chalcocite. A separation of the zinc and copper was practically impossible. The solution to the problem seemed to be in floating a bulk zinc-copper concentrate which was sent to cleaner cells, where copper was depressed by Redsol, and zinc cleaner tails constituted the copper concentrate. During this period the recovery of the copper mineral as contained in the copper concentrate was not satisfactory.

As the mine workings deepened, it was found, as expected, that the character of the mill feed changed. The abundant chalcocite found in the upper levels gave way to chalcopyrite, although chalcocite was still found along breaks and seams on the lower levels. So, in September, 1943, it was decided to try to make a more orthodox separation. About a month's work was spent in the laboratory on preliminary test work, where it was found that there was still enough soluble copper in the ore to preactivate the sphalerite, especially in an alkaline circuit. The pH of the pulp appeared to be the determining factor, and not the material used to obtain this pH. It made no difference whether lime, soda ash, or caustic soda was used—the zinc was still activated and floated with the copper.

HIGHLY FOLDED DIKES in massive sulphide ore.

Because the almost universal way of floating sphalerite is by activating with copper salts in alkaline pulps, and as copper salts were formed in grinding, and present in the ore, it was reasonable to expect that if the alkalinity were withheld the zinc would not float so readily. Subsequent tests confirmed this reasoning as separations were made in neutral pulps—pulps of a pH range of 6.8 to 7.2. These tests showed that with the ore being mined at that time, the following results could be expected:

	Zinc Assay, Percent	Copper Assay, Percent
Heads	12.0	2.5
Zn Conc.	55 to 60	1 to 2
Cu Conc.	10 to 20	20 to 28
Tails	0.5 to 1.5	Tr. to 0.2

These tests also showed that about 90 percent of the zinc was recovered into zinc concentrates, and about 75 percent of the copper went into the copper concentrates. The existing flowsheet was then changed to correspond to the test work. See illustration of revised flowsheet for Big Bend ore. (See page 69.)

As actual operations proceeded, several interesting points became apparent. For one thing, the addition of copper sulphate to the zinc cleaner tails is quite necessary, as this product receives no additional conditioning. It also counteracts the small amount of cyanide added to the cleaner cells. The staging of the promoters in the copper circuit

SQUARE SETS of 8x8-in. timber in Big Bend mine.

Increased Recovery Due to Scavenger Cells

Product	% Weight	Assay Zn, %	Assay Cu, %	Recovery Zn, %	Recovery Cu %
With scavenger cells:					
Feed	100.0	12.55	2.01	100.0	100.0
Zn Conc.	21.81	52.6	2.58	91.4	28.1
Cu Conc.	5.26	10.9	25.2	4.6	66.0
Tails	72.93	0.68	0.162	4.0	5.9
Without scavenger cells:					
Feed	100.0	11.81	1.88	100.0	100.0
Zn Conc.	18.64	53.69	2.72	84.7	26.8
Cu Conc.	5.52	15.63	23.28	7.3	69.8
Tails	75.84	1.24	0.08	8.0	3.3

is important. If enough promoter is added in No. 1 conditioner to promote all of the copper it also activates zinc that cannot be depressed in the cleaners. However, by adding smaller amounts in two places, the copper recovery is improved without hindering separation.

Accelerate Conditioners

An interesting point brought out was the matter of agitation and aëration. When the new flowsheet was installed, all conditioners were equipped with 1½-hp. motors, which were not large enough to give good aëration. Plant practice did not come up to the results of the laboratory work, and, in retrospect, it was realized that the aëration obtained in the Fagergren laboratory cell was much greater than that in the underpowered plant conditioners. New 5-hp. motors were put on the tanks, and the Devereaux blades steepened to a 40-deg. pitch and "revved" up to 300 r.p.m. The tailing losses dropped immediately. Increased pulp densities may also have reduced tailing losses. Before the larger motors were installed, the highest density obtainable in the copper circuit was about 24 to 25 percent solids, with a corresponding density of 19 to 20 percent solids in the zinc circuit. Any attempt to raise these densities would result in bogging down the conditioners. At present, a density of 30 to 31 percent solids is carried in the copper circuit, and one of 25 to 26 percent in the zinc circuit.

As the operator of any small mine well knows, the problem of mixing ores from different parts of the mine presents difficulties. The Big Bend property is no exception, and expediency in getting ore out is often more important than keeping grade constant. The grade of the ore treated at the mill sometimes drops to 5 or 6 percent zinc, and a few hours later may be as high as 25 to 30 percent. This, of course, is unusual, but it does happen. At any rate, operation is difficult even under the best of conditions, and the scavenger cells were added to act as a safety valve, or, perhaps, a "pig tail" when the very rich ore is being treated. This addition worked out even better than expected, and improved the zinc recovery by 4 or 5 percent. Metallurgical results are given in the accompanying table for both the operation with scavenger cells, and without, the figures in both cases being for a full month's run.

It is believed that the additional time obtained in these cells plus the stronger promoter added near the end of the zinc circuit are responsible for the increased recoveries.

At present, an alternate hookup is used when zinc heads are high. In this scheme, the concentrates from the first zinc rougher cell are pulled as finished concentrates. The concentrates from the last three cells go to the cleaner cells, and are treated in the usual manner. This flow scheme gives the lower tail without impairing grade of concentrate when zinc heads are especially high.

Metals Produced

Mill tonnage has gradually been increased. The current rate is 1,500 tons per month. Monthly production of metals approximates 300,000 lb. zinc, 40,000 lb. copper, and 4,000 lb. lead. About 30 men are currently employed. Metal production per man-shift underground is about 900 lb. of zinc, copper, and lead.

Thanks are extended to Otto R. Brown, field representative, American Cyanamid Corporation, whose ideas and suggestions, especially in the early life of the operation, were always welcome and helpful. Credit is also due the staff and personnel of the organization, whose cooperation has made the enterprise a successful one. The staff includes D. A. Moyer, master mechanic; R. N. Diggles, mill superintendent; J. C. Lawton, mine superintendent; Tom Jones, foreman; and Joe Collie, chemist. Hoefling Brothers, of Sacramento, Calif., also operate the Spud Patch Placers near Atolia, Calif., and are treating 1,000 cu.yd. per day at this operation. Allan E. Jones is general manager of Hoefling Brothers mining division.

Mining Statistics Reflect War's Effect on Industry

THE ACCOMPANYING GRAPHS, charts, and tables, based chiefly on information supplied by John Croston, Office of Vice Chairman for Metals and Minerals, War Production Board, show how the mining industry used its manpower in turning out its all-time record production. Production, employment, and output-per-man curves reveal the manpower employed and its efficiency under wartime conditions. Labor turnover and absenteeism statistics are also presented.

Employment Curves

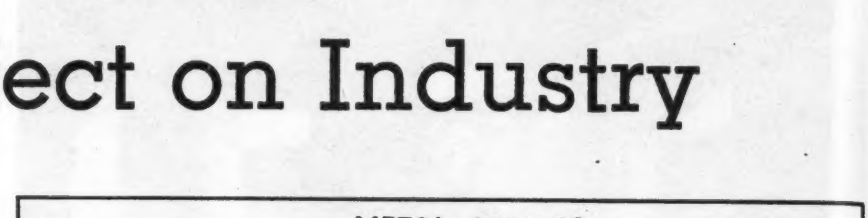
Most notable is the sharp decline of employees engaged in gold and silver mining. Inroads made by Selective Service contributed to a decrease of approximately 13,000 workers from Nov., 1941, to Oct. 15, 1942, when the WPB order closing gold mines was executed. This order accounted for a further decrease of about 5,000 workers during the remainder of 1942. Concurrently, U.S. Employment Service diverted a portion of the released gold and silver miners to the rapidly decreasing labor ranks of other more vital metal mines. Furloughed solders returning to the lead, zinc, and copper mines in 1942 and in 1943 account for two sharp rises in the employment curves. On the whole, employment levels prior to 1944 appear to have been more stable than indicated by news reports of critical manpower shortages.

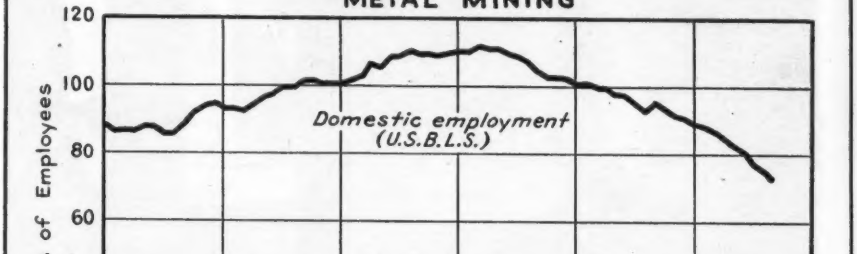
The employment curves are based on figures supplied by the U. S. Bureau of Labor Statistics. However, they do not lend themselves to precise interpretation, because such factors as increased working hours per month are not ncorporated. For instance, U.S.B.L.S. reports that the total number of employees in the iron mining industry increased approximately 2.4 percent from 1940 to 1941, while total man-hours increased 15 percent in the same period.

Production

Production curves plotted on the basis of monthly or average monthly tons of ore or recoverable metal are notably uniform. Available manpower was not the only factor affecting production trends. The payment of premium prices on over-quota production of copper, lead, and zinc, instituted on Feb. 1, 1942, was an important stimulus to production, limited partly by manpower shortage. It was estimated at that time by government officials that premium payment would "increase lead and zinc production by at least 30 percent over the current rate by the end of 1942." Although no such objective was attained, a downward production trend would doubtlessly have developed had it not been for the bolstering effect of the Premium-Quota plan. Subsidies contributed toward the retention o workmen who stayed in the mines by helping to finance the necessary wages.

Considering the abnormal conditions which prevailed, these curves indicate a surprisingly uniform performance in terms of production of





1. Source U.S.B.M. Includes a small amount of lead and zinc produced at mines classed as copper mines, but excludes copper produced at lead and zinc mines. Straight-line portion of curve based on average monthly production for year as reported by U.S.B.M.
2. Source: WPB and U.S.E.S. Curved based on figures derived by dividing number of open-pit and underground productive wage earners into matched set of production figures from individual mines.

recoverable metal per productive wage earner per month. The noticeable but temporary drop in efficiency following the release of soldiers to the lead, zinc, and copper mines is probably due to their unfamiliarity with new operations. Productivity figures based on recoverable metal tend to conceal the effects of mining low-grade ores. Therefore ore-ton efficiency was somewhat higher than the curves indicate.

Output-per-Man Curves

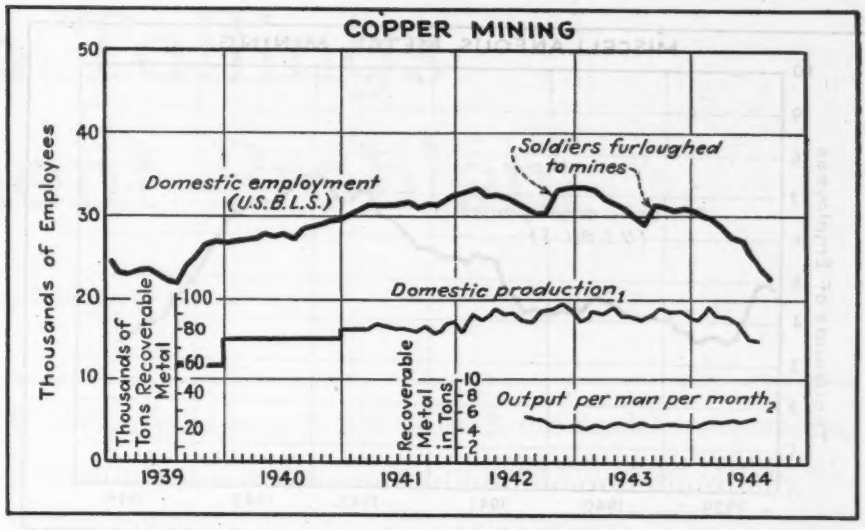
The productivity curves were plotted from statistics compiled and interpreted by Mr. Croston and assistants, who incorporated information from Form U.S.E.S. 270.6, which lists productive and development wage earners separately for both underground and open pit mines. Additional assistance was rendered to WPB by the reports of U. S. Copper Association, L. H. McColgin of Joplin, Lead Industries Association, Utah Metal Mine Operators Association, American Zinc Institute, and numerous mining, smelting, and refining companies.

Obviously, numerous irregularities in various mining and milling operations preclude any figures of refined accuracy. However, in spite of such obstacles, a system of interpreting correlated labor and production statistics was evolved which proved useful in guiding regulatory measures of government agencies. Quota Committee analysts used productivity figures to determine the trend of output per man at various mines. In 1943 the Mineral Classification Committee commenced compiling a monthly list which ranks mines in the order of their productivity within each metal group. This well-known Mineral Classification List serves as a guide for the Employment Service and Area Production Emergency Committees in placing miners where their efforts will result in greatest output of metal per shift.

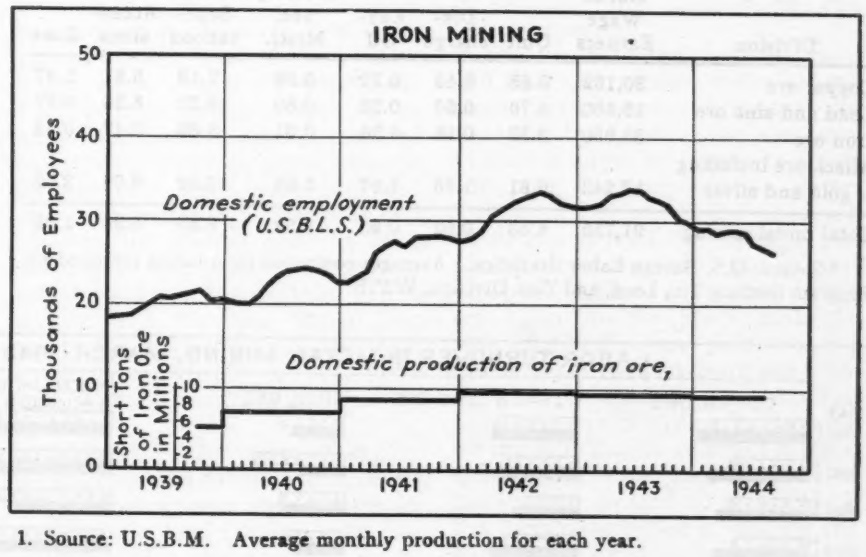
Labor Turnover

Labor turnover in metal mines is presented in terms of separations and accessions in the accompanying chart, which was also supplied by the Office of Vice Chairman for Metals and Minerals, War Production Board. The separation rate for metal mining as a whole was about the same as for manufacturing industries during the 16-month period analyzed.

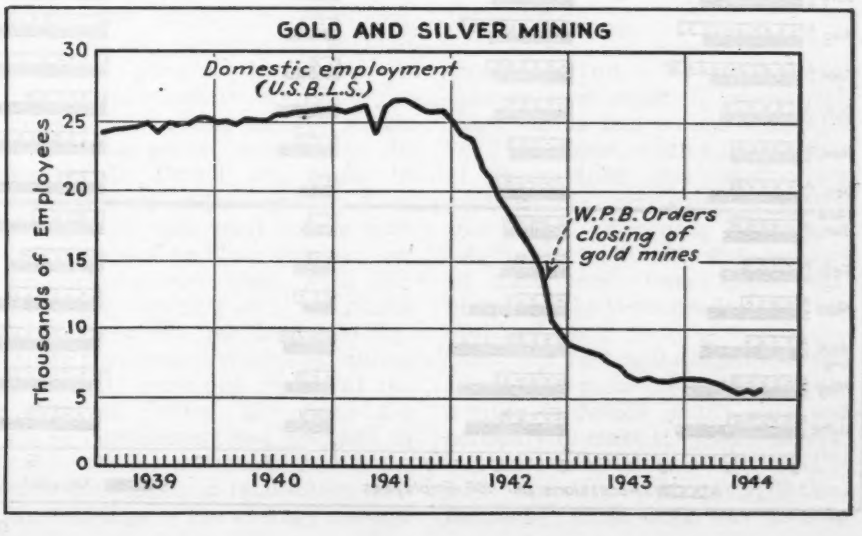
In the chart, net loss or gain in number of laborers per month is represented by the difference in

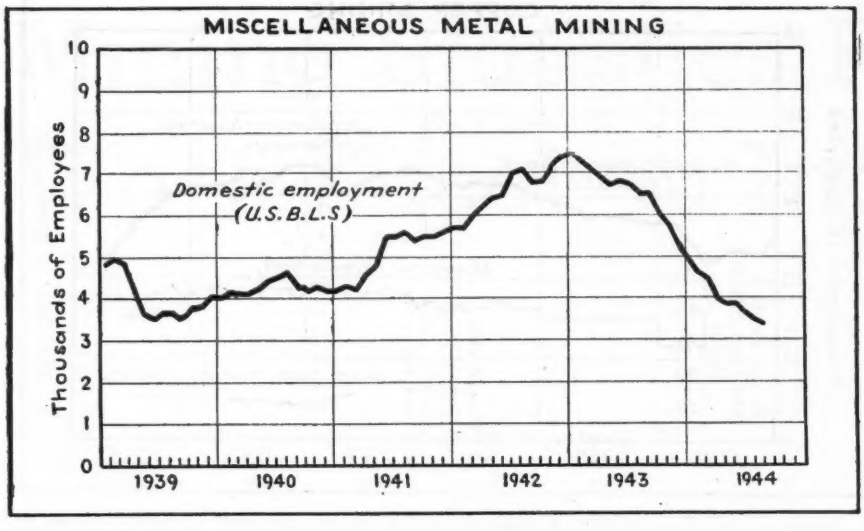


1. Source: U.S.B.M. Includes a small amount of copper produced at mines classed as lead and zinc producers, but excludes any lead, zinc, or other metals produced at copper mines. Straight-line portion of curved based on average monthly production for year as reported by U.S.B.M.
2. Source: W.P.B. and U.S.E.S. Curved based on figures derived by dividing number open-pit and underground productive wage earners into matched set of production figures from individual mines.



1. Source: U.S.B.M. Average monthly production for each year.





Average Monthly Labor Turnover in Mining Industry*

March, 1943, to June, 1944, inclusive

Rates per 100 Employees

Division	No. of Wage Earners	Quit	Discharge	Lay-Off	Military and Miscl.	Total Separations	Total Accessions	Loss
Copper ore	30,162	5.55	0.45	0.29	0.89	7.18	5.81	1.37
Lead and zinc ore	18,400	4.70	0.50	0.23	0.89	6.32	5.35	0.97
Iron ore	30,950	2.33	0.18	0.38	0.91	3.80	3.47	0.33
Miscl. ore including gold and silver	12,243	6.61	1.26	1.67	1.04	10.58	8.06	2.52
Total metal mining	91,755	4.53	0.50	0.50	0.92	6.45	5.36	1.09

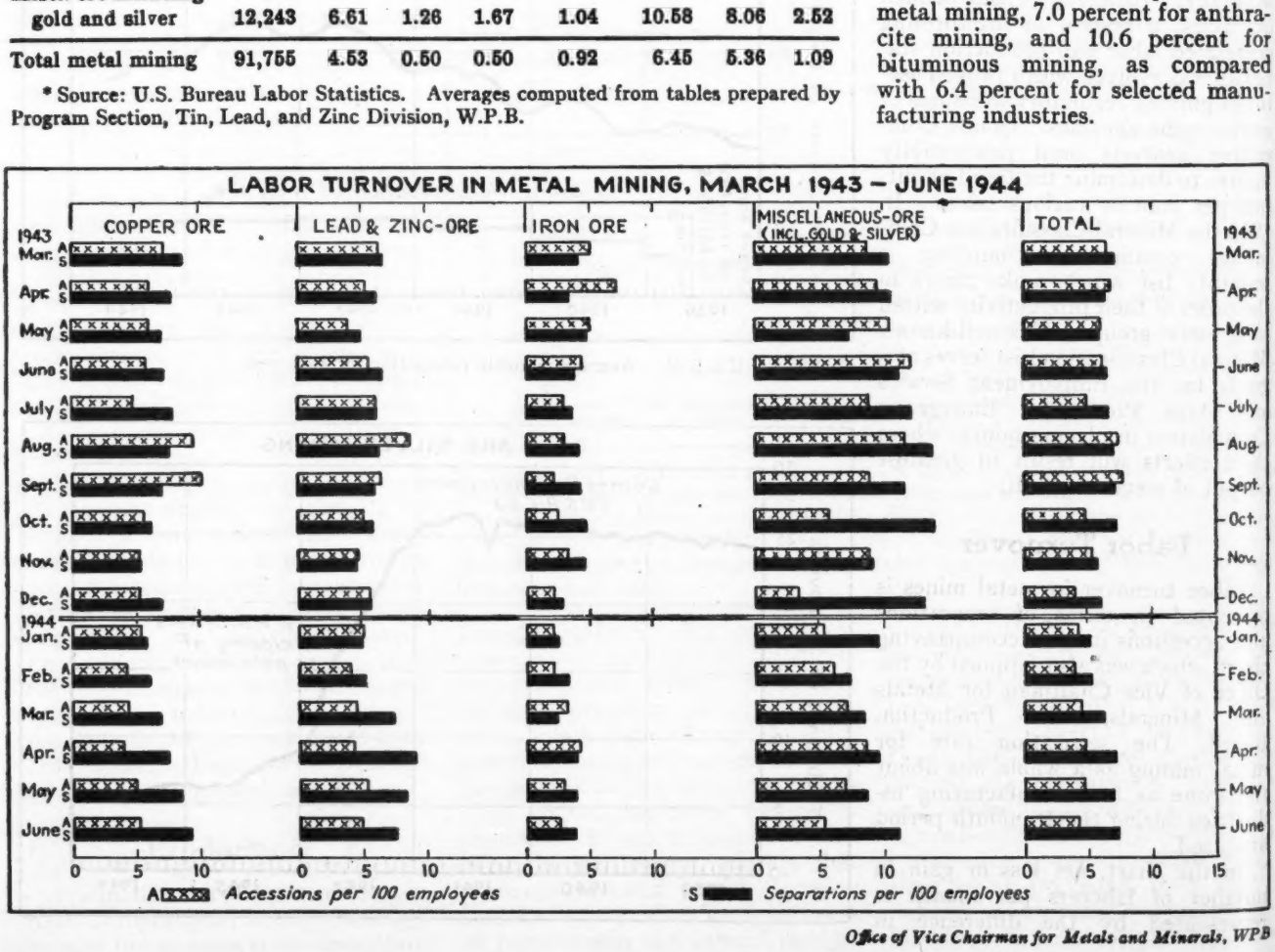
* Source: U.S. Bureau Labor Statistics. Averages computed from tables prepared by Program Section, Tin, Lead, and Zinc Division, W.P.B.

length between the white and black bars. Copper, lead, and zinc mines experienced labor losses every month except during August and September, 1943, when a second group of soldiers was furloughed to work in those mines. The rate of loss in copper mines has been increasing steadily since January, 1944, whereas the rate of loss for lead and zinc mines reached a maximum in April, 1944, and has since decreased. The gain in iron-ore mines early in 1943 was due to resumption of operations of properties closed during the winter.

Reasons for separations are classified in the accompanying table of average monthly turnover for a period of 16 months. Average net monthly losses are also listed. Rate of military separations is very much greater for mining than for manufacturing industries because fewer women are employed in the mines.

Absenteeism

Statistics supplied by the U.S.B.L.S. and compiled by the Program Section of the Tin, Lead and Zinc Division, WPB, reveal that the average monthly absence rates during the period of March, 1943, to August, 1944, inclusive was 6.8 percent for metal mining, 7.0 percent for anthracite mining, and 10.6 percent for bituminous mining, as compared with 6.4 percent for selected manufacturing industries.



Office of Vice Chairman for Metals and Minerals, WPB

Solving a Tailings Re-treatment Problem

ALBERT SILVER, *Metallurgist, Tonopah, Nev.*

II—When gold went to $35 in 1933, the Bradshaw operation, a description of whose early struggles appeared last month, took a new lease on life. This is the second of three installments in the story of this unusual mine, where cyanidation was combined with hydraulicking to make a profitable venture of a seemingly impossible task.

AFTER CAREFUL SAMPLING and testing of the north area of the original tailings deposit, on which 600,000 tons of Period (1) tailings were deposited, it was decided that the operation could be extended for perhaps two seasons. While this work was in progress, however, the price of gold was established at $35 per ounce, and it then became feasible to treat the entire deposit. This involved building new sumps and new pump stations as well as over 2,000 ft. of new solution and pulp lines; also installing three additional settlers in the mill. The entire cost was estimated at $40,000, and to take care of this expenditure, the affairs of Bradshaw, Inc., were closed out and a new company known as Bradshaw Syndicate, Inc., was organized with those of the original concern who were willing to gamble on the new venture.

The lower per-ton recovery naturally called for more tonnage, and more water which might well prove a serious bottleneck. For two years the required 1,250-ton daily capacity could be met by augmenting pumping facilities; beyond this time it was a matter of developing new water sources. This operating period was stretched to four years, and resulted in the recovery of $735,293.28 from the milling of 1,369,000 tons.

Pumping Slimes.—Aside from the construction of new sumps, pump house, and pipe lines, the plan of mining operation at Sump No. 3 was basically the same as at Sump No. 2. An 8-in. Wilfley pump direct-connected to a 100-hp., 870-r.p.m. motor (pump formerly in sump No. 2) was placed in sump No. 3 to deliver the pulp through a 12-in. wood-stave pipe line a distance of 900 ft. against a static head of 56 ft. to a surge tank at the first pump station. In this pump station was placed an 8-in. Wilfley pump direct-connected to a 1,160-r.p.m., 150-hp. motor (same layout as at the other two sumps) to deliver the pulp a distance of 1,900 ft. to the booster station (also in the previous lay-out) against a static head of 97 ft. Also in this same station was placed the 4-in. 2-stage Krogh pump as at sump No. 2. This station required the services of an operator, and to facilitate his work, telephone and signal communications were provided between the station and the mill, as formerly, and between the station and the sump. The capacity of the mining and pumping layout for this period was 1,400 g.p.m. and from fourteen to fifteen settlers filled daily with 1.32-sp.gr. pulp.

Cyanidation.—The increased capacity in this period naturally demanded some improvements and changes in equipment. For example, the installation of a dry vacuum pump, augmenting the wet pumps with which the filters were equipped, increased the capacity of the filter plant 16 percent. In Period (1) this added capacity served to increase the washing period, which, with lower-grade material to be treated in Period (2), could be translated into more tonnage. Also, the No. 10 duck used on the filter leaves tended to blind quickly, and experiments were made with No. 117 twill, resulting in a leaf which had a long life free from blinding. These experiments conducted during Period (1) were put to use at the outset of Period (2) when the entire complement was changed to twill. As far as known this is the only installation of twill leaves on a Butters filter. The average increase in capacity and effectiveness was about 20 percent.

As lack of water became more and more of a menace, many experiments were made to relieve the situation by conditioning the pulp so that it might be flumed to waste with the least amount of water. This work resulted in the discovery of turkey red oil (75 percent sulphonated castor oil) as a conditioner. A small amount of turkey red added to the stock tanks (1 pint per 100 dry tons) permitted the discharge of residues from the filter at a high specific gravity. The filter cake, which ordinarily dropped off the filter leaf in compact masses, dropped off in a condition which immediately pulped up into a thick but fluid mass before it reached the flume and flowed to its destination without causing any obstruction in the flume.

Precipitation.—No mechanical changes were made in this department during this period except for the 1935 season, when a new process of precipitation was tried which involved the installation of a new zinc feeder. The daily tonnage of solution precipitated was reduced to 1,200 tons (from 1,600 tons) because of the lower head values that obtained.

In the first installment of this article it was mentioned that only a trace of NaCN in the pulp was necessary to make the gold recovery, but approximately 0.20 lb. NaCN was necessary for precipitation. Naturally, much work was done to

avoid the necessity of building up the solution strength purely for precipitation purposes. Our job appeared to be an ideal spot to try out a process of precipitation suggested by L. D. Mills and Thomas B. Crowe, of the Merrill Co. Briefly, this consisted of lowering the pH of the pregnant solution to about 7.6 by addition of aluminum sulphate, or, better still, maintaining this pH throughout the plant if possible, and feeding sodium bisulphite into the solution at the float box simultaneously with the zinc feed. Laboratory experiments indicated that complete precipitation was obtainable regardless of cyanide strength, if sufficient bisulphite and zinc were used; in fact, with very low cyanide strengths it was necessary to precipitate all of the copper present in order to precipitate all of the gold from the solution.

In a plant trial, it was determined that selective precipitation of the gold could be obtained by increasing the cyanide strength; in other words a condition could be maintained whereby good gold precipitation could be had without taking down all of the copper. The experiment was started off with the usual cyanide strength and gradually cut back to 0.10 lb. NaCN.

Purging With Cyanide

For a while good results were obtained, except for the serious drops in the grade of precipitates produced because of the excess copper precipitated, but a time came when the solution tails would rise unexpectedly, with no apparent cause. The cure was found to be a cyanide purge, but because there was no safe way of telling just when it should be applied, an hourly purge consisting of 3½ lb. of NaCN, dissolved beforehand for the purpose, was added in one gulp to the precipitation tank as a safety measure.

For the most part, good precipitation results were obtained, but as colder weather approached, it became increasingly difficult to maintain the proper pH in the precipitation circuit, and this was allowed to go back to former practice after a five months' trial. From this time on to the end of the project, sodium bisulphite was used only to start off precipitation after each clean-up, resulting in immediate barrens rather than the usual diminishing tail over the first 24-hr. period.

In spite of the fact that the process was discontinued, it showed a possibility of a 50 percent saving in

Supplies Used by Bradshaw Tailings Operation Period 2. 1934-1937 Inc.

Tons milled—1,369,000

	Cost at Plant	Cost per Ton Milled	Total Used, Lb.	Consumption Lb./Ton
White cyanide	$56,303.15	$0.041	374,528	0.273
Quicklime	30,810.50	0.023	3,290,267	2.400
Zinc dust	6,526.81	0.005	62,000	0.045
Muriatic acid	3,290.28	0.002	89,125	0.065
Explosives	11,736.66	0.008	91,050	0.067
Misc. and water	93,988.73	0.069		
Total all supplies	202,656.13	0.148		

General Cost Distribution Period 2. 1934-1937, Inc.

Direct Cost	Total Cost	Cost Per Ton
Labor	$156,975.50	$0.115
Supplies	202,656.13	0.148
Power	113,959.98	0.083
Total direct	$473,591.61	$0.346
Indirect Costs		
Royalties	$53,187.18	$0.039
Adm. & salaries	48,300.00	0.035
Other indirect	32,764.73	0.024
Total indirect	$134,251.91	$0.098
Marketing Costs		
Freight and treatment	$6,541.10	$0.005
Smelter losses	19,623.19	0.014
Bullion tax	3,622.32	0.003
Total marketing	$29,786.61	$0.022
Total all costs	$637,630.13	$0.466
Total production return	735,293.28	0.537
Operating profit	97,663.15	0.071

Operational Cost Distribution in $/Ton, Period 2. 1934-1937, Inc.

	Labor	Supplies	Power	Total
Pumping slimes	$0.041	$0.025	$0.031	$0.097
Cyanidation	0.050	0.077	0.034	0.161
Precipitation	0.015	0.009	0.010	0.034
Water supply	0.009	0.037	0.008	0.054
Totals	$0.115	$0.148	$0.083	$0.346

Metallurgical Results, Period 2. 1934-1937, Inc.

Total tons milled	1,369,000
Gold recovered, oz	20,722.540
Silver recovered, oz	15,469.46
Total value recovered	$735,293.28
Calculated heads, oz. Au/ton	0.06425
Average tailing assay, oz. Au/ton	0.0200
Gold recovered, oz./ton	0.01514
Silver recovered, oz./ton	0.01130
Value recovered, $/ton	$0.537

CAREFULLY DESIGNED nozzles gave the monitors of the Bradshaw operation fine jets and good punching power. In its second period, lasting four years, this unique cyanide plant recovered $735,293.28.

cyanide (in fact for one month the cyanide was cut to 25 percent of normal consumption), with some saving of lime due to the effort to maintain low alkalinities. However, the filter leaves were beginning to show a dangerous accumulation of sulphates, and the added costs of precipitation and marketing, together with a decrease in gold recovery of 0.001 oz. per ton, made it advisable to return to former practice. It would appear that under certain conditions the process that has been described might be applied to a low-grade water-wash circuit.

Water Supply.—Period No. 2 was started with the usual water sources, but with the gradual diminishing supply from the local water utility it was a foregone conclusion that trouble might develop at any time. For this reason many old shafts were investigated, many legends listened to, one dug well was sunk, a 400-ft. well drilled, a 500-ft. cased well cleaned out, and three mine shafts were cleaned out and retimbered in the scramble for more water to permit continued operation.

The Great Bend shaft and equipment was repaired and a 100-g.p.m. deep-well turbine pump installed to a depth of 240 ft. so that the flush water could be pumped off at will. The pumping was controlled by an electrically operated time switch. With this water the plant went immediately on full production and held this way until the Highland shaft could be repaired and fitted out. The Highland installation consisted of a 100-g.p.m. bracket pump in the shaft delivering water to a tank at the surface, and a two-stage 1½-in. Krogh pump to deliver the water to the mill. Both pumps were controlled by float switches. About the time the Great Bend shaft had been pumped down to a normal flow of 12,000 gallons per day and the shaft repairs were becoming increasingly difficult, a dispute with the owners resulted in pulling the pump in the early part of 1937.

A well-drilling rig was then set up over the Highland shaft and the muck pile in the shaft drilled and cased with perforated casing to the bottom, a distance of 190 ft. from the surface, and the deep well pump from the Great Bend installed in the casing to pump direct to the mill. Although the Highland water was distinctly acid to methyl orange, it proved to be a valuable supply and provided a supply of 33,000 gallons per day.

The well-drilling rig was next moved to a cased well formerly the source of water for the Tonopah and Tidewater R.R. Co. A new pump was purchased, rods were repaired and new sections put in and a new Meyers jack head, power, and pipe lines, etc., installed. This resulted in an addition of 13,000 gallons of water per day to the supply, requiring an additional line from a point in a wash to the mill, a distance of 2,500 ft. and a lift of only 25 ft.

Water was drawn from various other shafts and wells, and with all of this effort, Period (2) was completed successfully, apparently with some water to spare for the venture to follow. The operations in Period 3 will be discussed in the December issue.

Core Recovery Increased by Improved Barrel Design

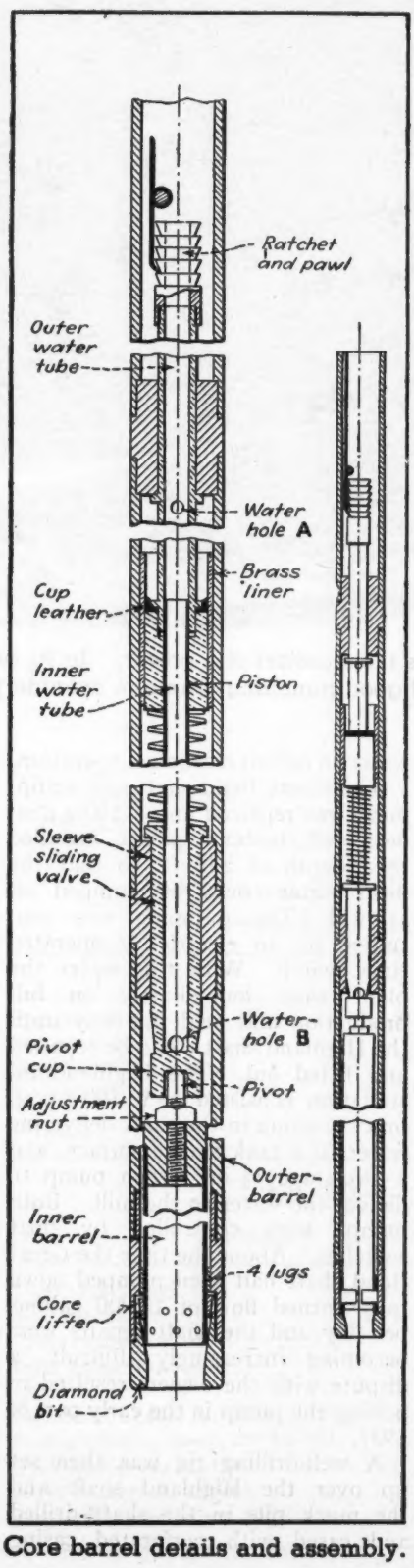
A SPECIAL double-tube core-barrel designed by C. E. Duffield, mechanical and boring engineer, Department of Mines, South Australia, and described by him in *Proceedings NS* 131–132 of Australasian Institute of Mining and Metallurgy, completely eliminated core loss in drilling projects conducted at Moonta and Wallaroo mines during 1943. The barrel functions satisfactorily in bad ground, and eliminates the need for sludge samples because it yields good cores. For the benefit of many readers who do not see the publications of the Institute, the following brief description is submitted.

The advantage of this barrel is the fact that as soon as the core jams in the inner barrel, due either to the barrel being full or by wedging of the core in the barrel, the water is cut off and the core is secured by the core lifter. The resulting suddenly increased water pressure is indicated on the driller's gage and warns him that the core is jammed and that the rods must be pulled.

How Barrel Operates

The manner in which the barrel functions may best be understood by referring to the accompanying illustrations, in which all essential parts are designated. It should be noted that the core lifter is placed on the outside of the inner core barrel, and that the inner barrel is pivoted on its upper end in the lowest portion of the sliding valve. Normally water enters through the outer tube, travels through the inner tube, then through the sliding valve, and emerges through hole *B*. From here it flows between the inner and outer barrels, and finally reaches the bit through holes in the lower part of the inner barrel.

Ordinarily, the inner barrel revolves with the outer, and passes over the core as it is being cut by the bit. When the core jams, or the barrel becomes filled, the inner barrel ceases revolving and pivots on the upper pivot and within the core lifter, both of which are well greased. (Refer to drawing showing stages of operation.) The drill continues to rotate, however, and the bit advances into the rock while the inner barrel remains stationary. This results in a relative movement of the inner barrel up the outer barrel. Several actions accompany this movement. The core lifter slips off the outer surface of the inner barrel and encircles the core; the inner water tube is pushed up and compresses the spring; and the water is finally cut off when hole *B* is pushed into the sleeve which encompasses the sliding valve. The adjusting nut is so set that the water is cut off at the same instant the core lifter slips off the inner barrel and on to the core. This simultaneous action is accompanied by a sudden rise of water pressure, which is indicated on the driller's gage and warns him to stop drilling.

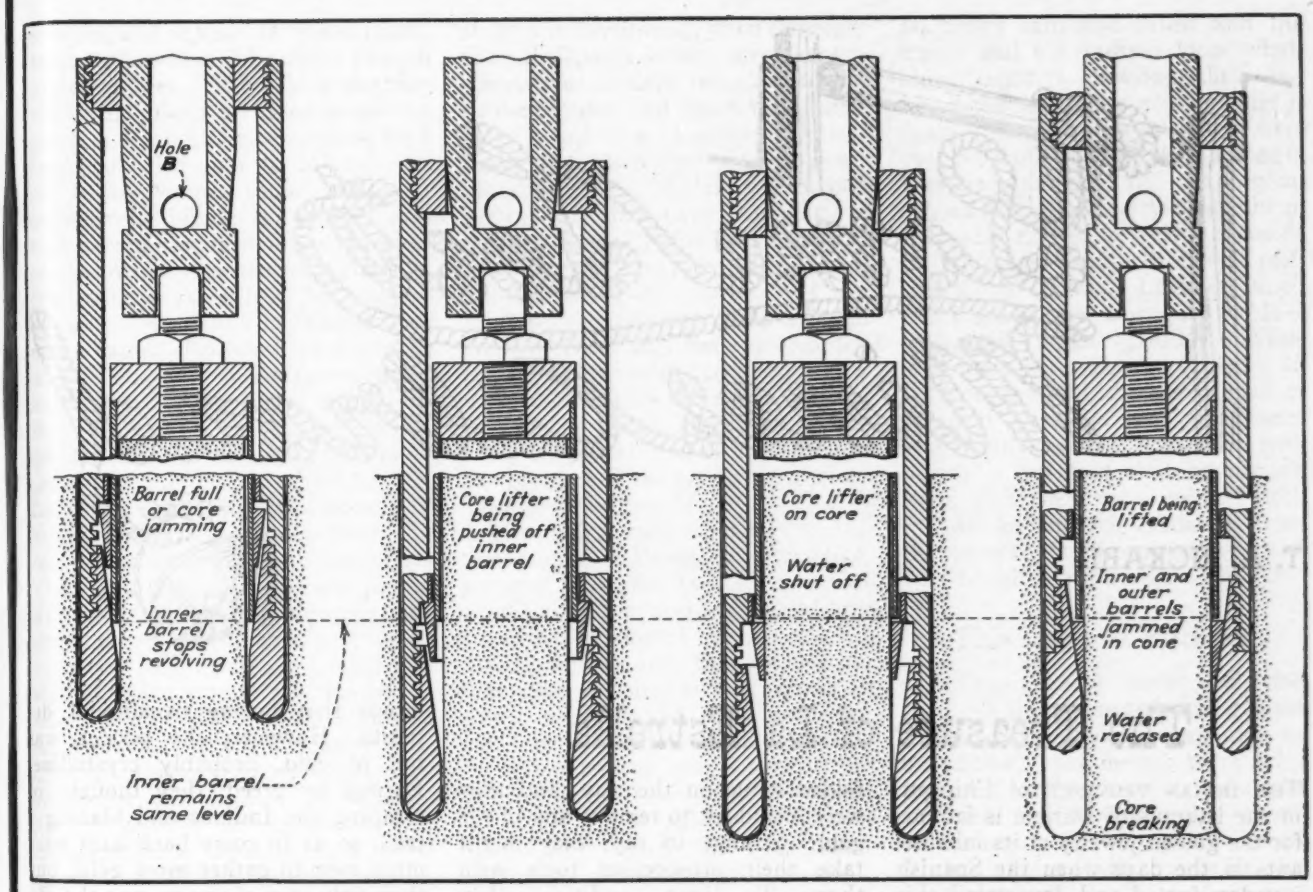


Core barrel details and assembly.

Water Pressure Released

As the core barrel is withdrawn, the pent-up, increased water pressure exerted through hole *A* causes the piston to compress the spring, thus forcing the sliding valve downward against the inner core barrel, which in turn drives the core lifter into the conical inner surface of the bit. The net effect of this movement is to wedge the core lifter securely against the core. Any reversal of this action is prevented by the ratchet and pawl above the outer water tube. The core, thus securely gripped, will be broken off when the barrel is withdrawn. It should also be noted that as the barrel is withdrawn, the relative motion of the inner and outer barrels produced by the expansion of the spring, uncovers hole *B*, thus releasing the high water pressure. A "wet pull" is thus prevented.

Improved core recovery was demonstrated by a comparison of two drill runs which were made at No. 7 Kurilla Bore at Kadina. With a standard barrel 11 ft. 6 in. of core were recovered from a 28 ft. 4 in. run; whereas 36 ft. 6 in. of core were recovered from a 36 ft. 6 in. hole with the new barrel. One hundred percent recovery was made when a hole penetrated through 15 in. of soft chalcopyrite adjoining hard porphyry at Bennett's lode at Moonta.


Hole B
Barrel full or core jamming
Inner barrel stops revolving
Inner barrel remains same level
Core lifter being pushed off inner barrel
Core lifter on core
Water shut off
Barrel being lifted
Inner and outer barrels jammed in cone
Water released
Core breaking

Stages of operation showing control of water, and core lifter gripping core.

S. B. Dickinson, director of Department of Mines, South Australia, reports that daily footage rates with the new type of barrel compare favorably with those obtained with ordinary core barrels.

Mr. Dickinson also reported that because the "foolproof" device shuts off the water automatically when the core jams, relatively inexperienced men can run diamond-drill outfits and get results equal to those obtained by experienced diamond drillers using normal-type core barrels.

The new-type core barrel was used in drilling a reservoir site near Adelaide to obtain information concerning the nature of bedrock. Although the rock comprised friable kaolinized schist, the core recovery was remarkably good. The only material lost was soft schist which did not compress the inner spring.

Minerals Analyzed by Thermal Method

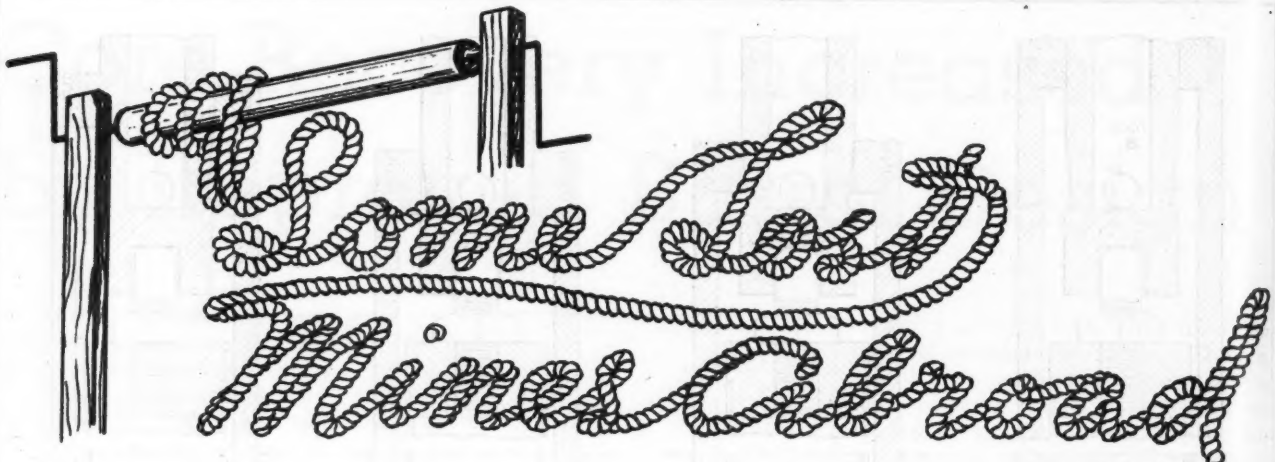
DIFFERENTIAL THERMAL ANALYSIS, based on the reaction of materials when subjected to heat, has established its reliability in quartz determinations and is being used successfully in such fields as the mining of raw materials, beneficiation of ores, manufacture of nonmetallic mineral products, and in the study of silicosis hazards in industrial dusts, according to Dr. R. R. Sayers, Director of U.S. Bureau of Mines, who recently announced the release of three reports describing applications of the method and equipment.

These reports which may be obtained from U.S.B.M., Washington D.C., are as follows: "An Apparatus for Differential Thermal Analysis"; "Differential Thermal Analysis of Quartz," and "Applications of Thermal Analysis to Clays and Aluminous Minerals," and are listed as Reports of Investigations 3762, 3763, and 3764, respectively.

Bureau chemists have outlined a quantitative procedure by thermal analysis which can detect as little as 1 percent quartz in a mixture and has some advantages over chemical, petrographic, and X-ray diffraction methods more commonly employed.

The apparatus used in experiments was constructed by a laboratory technician for slightly more than $100. Report 3762 contains working drawings for construction, approximate costs of the most important parts, operation details, and examples of application. The apparatus is self-recording, requires a minimum of attention by the operator, and allows for two analyses to be made per day. The sensitivity can be adjusted to detect relatively weak reactions, thus increasing its value for analyses in which small occurrences of a mineral are under study.

A table of characteristic peak temperatures for several minerals is published in the reports, together with typical differential thermal analysis curves for quartz, siderite, hematite, goethite, limonite, lepidocrocite, gibbsite, diaspore, kaolinite, endellite, halloysite, allophane, illite, montmorillonite, nontronite, meerschaum, pyrophyllite, talc, muscovite, prochlorite, and sheridanite.



T. A. RICKARD

The Treasure of La Estrella

THE INDIAN PROVINCE of Chiriqui, in the isthmus of Darien, is famous for the golden jewelry of its inhabitants in the days when the Spanish invaders looted and devastated this part of the world. The conquistadores enslaved the poor Indians and forced them to dig for the gold out of which they had made many bizarre trinkets. It is not surprising therefore that a lost mine has been placed in this region.

We are told that in 1903, shortly before the Republic of Panama came into being, two Americans, John Benson and George Hines, came to this part of Colombia. Benson and his friend had been working together in California, but with meagre success. They decided to seek some of the lost treasure of the olden days. One of the Indians they employed as a guide was José, of the Tabasara tribe. He was the son of a chief that had led a revolt and killed the Spaniards at the celebrated La Estrella (The Star) mine, which had yielded gold fabulously. The only access to the mine was over a narrow stone bridge. Benson and Hines, so the tale proceeds, asked José to take them to the mine, but he refused, because foreigners were not permitted to approach it. He said that his father might grant the requisite permission. The two Californians went to the village of the tribe, met the father, and persuaded the Indian to permit them to visit the mine, under prescribed conditions. They were to leave any weapons in their possession, they were to be blindfolded while on the way, and they were forbidden to remove any of the gold. Strange to say, they might take their prospecting tools with them. To these conditions they agreed perforce. On arrival at the mine, all but one of the Indians disappeared. The two prospectors were left to their own devices for a day. Looking around, they saw a tunnel nearly closed by fallen rock. This was full of streaks of yellow quartz, "showing a decided north and south strike"—a psuedo-technical observation that has no significance except to the unsophisticated. They began picking at the quartz and soon broke away pieces "speckled all over with gold." Shortly afterward they broke into a pocket "full of nuggets." Such slips as this are common in such yarns. Nuggets, of course, are not found in veins of quartz; they are the water-worn lumps that belong to alluvial deposits. However, the pocket was full of gold, probably crystalline. Excited by greed, they thought of escaping the Indians and blazing a trail, so as to come back later with more men to gather more gold, but their only way of escape was the old stone bridge, which they had reason to believe was well guarded. They entered the tunnel and groped their way for 150 feet, when they saw daylight ahead of them. They crawled over fallen rock and emerged at last on the other side of the ridge. On the mountain-side was a big pile of broken rock. They jumped upon it, and scrambled down, in a hurry to make their escape.

A third arrow entered the base of his neck.

Benson heard a hissing sound and something hit the rock at his side. An arrow! Benson was hit in the back, he fell down, and tried to get under cover. Hines had been hit twice in the shoulders, and then a third arrow entered the base of his neck. The jugular vein had been

severed, and he knew he was doomed. With his last breath he urged Benson to leave him. There was nothing else to do; Benson rushed down the gulch and ran along the stream that eventually led him to safety. An old Indian woman found him lying unconscious beside the stream and took care of him until, four days later, he recovered his reason. After a few more days of rest, he dragged himself along until he reached an army camp, the wreck of a strong man. Safe once more, he collapsed and suffered a long illness, caused by the poison from the arrow. When his health was regained, he determined to find his way back to the La Estrella treasure. Unfortunately he was killed in a skirmish before he could put his purpose to the test. This is a typical lost-mine story. The man that finds it comes to a sudden end and the mine is again lost.

A sequel to the tale of La Estrella was provided by sundry newspaper dispatches in July of 1937. It was reported that a Frenchman (probably an Alsatian) named Johannes van Steck, and his two companions, Arring Thorpe, an American, and Anton Hill, a German, had found a great treasure—the gold of La Estrella! The international group of three prospectors was searching for something that might become a mine. They discovered some ore and decided to peg a claim. Van Steck, whistling softly, was driving a stake into the ground, when suddenly the hill slope gave way, revealing the opening into a dark tunnel. He slid to the bottom, and his two comrades soon joined him in eager curiosity. He pointed excitedly at a pile of dust-covered blocks. All three hastened to brush the dust away, exposing the bright gleam of yellow gold! It was an enormous treasure. They were spellbound. Each block was an ingot bearing the seal of the Spanish crown. Here had been stored for centuries the wealth extracted from a mine of fabulous richness. At the foot of the Santa Maria mountains these three men had stumbled upon the product of the La Estrella mine. They were millionaires!

The news was reported to the government of Panama. Van Steck asserted that Hill, the German, had tried to kill him, and had chased him through the jungle. Thorpe denied all knowledge of the adventure. The chief of police arrived, and Van Steck prepared to show him the treasure. "Wait a minute," he said, "I will enter the tunnel first." He disappeared. There came the sound of a shot. The police entered the tunnel and found the Frenchman on the ground with a bullet through his head. No gold was to be seen. Had it been removed to evade the government tax? Was the whole story a hoax? Must the finders of lost mines always come to a fatal end before they can enjoy their luck?

The Lost Lasseter Reef

A recent story of a lost mine comes from Australia. It has served as the subject of an interesting book, in which the author tells not only the mining tale, but also gives many excellent descriptions of native life in the very heart of the Australian continent.

We are told that, in about 1898, Harry Lasseter was prospecting for rubies in central Australia, near the Western Australian border, on the desert fringe. "He had lost himself, and found the reef."[1] The reef that Lasseter found was full of gold, like plums in a pudding. After stumbling upon the rich vein of gold ore, Lasseter wandered without any sense of direction and his horses died one by one. "An Afghan camel-driver found him raving with thirst and clutching a bag of gold specimens, and carried him to the surveying camp on the West Australian stock route." He was brought back to health by the kindly help of a surveyor named Harding, who then suggested that "they both return to the reef," but Lasseter at that time was in no mood to invade the desert again.

Three years later, however, he did go with Harding. They relocated the reef; but, on returning to Carnarvon, on the western coast, they were mortified to find their watches one hour and fifteen minutes behind the clocks. "This meant that if their time had been incorrect when they took bearings of the reef, their location was incorrect also." Here we have a false note. If they ascertained exactly how wrong their watches were, could they not make the compensating correction in their calculations? Even that was not needed. Why did they not retrace their steps? The desert will retain the tracks of man or beast for many days, even weeks and months. The author himself says: "Tracks in the desert country last a surprising time. Camel tracks have been known to last for years where no heavy rain had fallen and the tracks had not crossed loose wind-blown sand."[1] Besides, they had found the reef once; why not find it again? In those days camels were used for haulage to the gold mines in Western Australia, and the Afghan drivers had been imported with them.

In any event, the two men made no effort to locate the gold reef, rich though it was. Lasseter joined the rush to the new gold fields—Kalgoorlie and Coolgardie—in Western Australia. Harding died. In 1916, we are told, the government of Western Australia sent two camel expeditions to find Lasseter's reef, but it is not said that he himself went with them as a guide. Both expeditions suffered casualties from the attacks of the aborigines and were forced to return discomfited.

The Legend Persists

Fourteen years more pass, and then we find Lasseter asking John Bailey, in Sydney, to organize an expedition, "not merely to refind a gold reef; it was to open up a new gold field and develop a new state," for the region was only partly desert; it had grass lands suitable for pasturage. Bailey's support was won and a company named the Central Australian Gold Exploration Company, Ltd., was organized under his leadership in 1930. A party was to travel in two motor trucks with an airplane in support. The plane would maintain communication with the base and would serve also to search ahead, finding water and the most practicable route for the trucks. Alice Springs was the rendezvous. This oasis is near the intersection of the 134th degree of east longitude and the Tropic of Capricorn. It is in Central Australia, both politically and geographically.

Misfortunes dog the expedition persistently. The motor trucks break down several times, the airplane crashes, a second one comes to grief, and in the end, after many unsuccessful efforts to find the lost reef, Lasseter sets forth with Paul Johns, an experienced desert man, on camels, in pursuit of his lure, believing that he knows the approximate position, near the Petermann Range and close to the Western Australian border. Johns also has the gold fever, and Lasseter is suspicious of him. When near the place, Lasseter goes forward twenty miles alone, finds the reef, and returns, smiling but silent. This irritates Johns; he and Lasseter have a violent quarrel and a terrific fight, which ends as

[1] Ion L. Idriess, "Lasseter's Last Ride," p. 15; 1936.

[1] Ibid., p. 180.

A camel driver found him raving with thirst.

suddenly as it began. They return to Ilbilba, an intermediate halting-place, and Lasseter sends Johns to Alice Springs with a telegram and letter to his company. We are not told whether he explicitly announced the relocating of the reef.

Then "Lasseter, with two camels, set off alone on his last ride." Why did he travel alone? Obviously it was dangerous and dreary to do so. This is an arid region, but not altogether desert. Tracts of sand there are, and areas almost as bare, on which only spinifex and mulga grow, but here and there are grassy glades in which wild horses and wild camels, strays from the white man's service, roam, together with groups of the so-called blacks, the aborigines. Water-holes in the rocks help to support life. An occasional lake or soak of alkaline water will lure the unwary. Rising above the wilderness, like reefs indeed, are rough rocky ridges, beckoning the prospector with the promise of possible mineral wealth.

We are told that several prospecting expeditions were in the region. They came from south and west, also in search of Lasseter's reef. We hear no more of them later, although it might be supposed that one or other of them would have been encountered as the parties searched for the lost mine.

Quest Ends in Death

Well, Lasseter was the only one to see it. That he did so is told on scraps of letter he wrote to his wife, these bits of paper having been found under the ashes of a camp-fire. The reef was a treasure-trove. "His heart beat violently at the sight of the yellow gold gleaming in the fractured rock. The reef was phenomenally rich: some of the stone was actually held together by threads of gold. Laughing aloud, he held up a gleaming specimen."[1] He filled a bag with specimens, and then pegged his claim with care. He photographed the pegs in place as well as the reef. Those photographs, we must infer, were lost when his camels bolted. For that is what happened. In the evening of the same joyous day, he was preparing to unload the camels, when first one and then the other rose to its feet and started to run. He tried to stop them, but was flung aside. He drew his revolver and tried to kill them, to save the water they were taking with them. On that water depended his life. He failed to stop them, they plunged into the stunted bush and appeared on the farther side, disappearing and reappearing until they faded into the ribboned sunset. He was a castaway in the desert. Hardly had he realized the fact, when a group of natives approached him. These Australian blacks were completely naked, dirty, and ugly. He had to wander with them for 78 days, receiving such food, little enough, as they cared to give him. The utmost tact was required to placate them and to avoid death at any moment from a spear thrust. He suffered from dysentery and underwent severe hardships while living with these primitive savages. In vain he held on to life, hoping that his friends would find him. At last, several weeks later, in the Petermann Range, close to the Western Australian border, Robert Buck, an experienced bushman, with camels and native helpers, found Lasseter's tracks, and eventually his poor emaciated body, under a canopy of dried bushes. In the ashes of his last camp-fire were found letters written on scraps of paper, telling the story of his misfortunes.[1]

But was the mine found? I think not. Although the author says that letters hidden within a corked bottle "described the locality of the reef and the natives, and gave much other information." Why was the reef not found? Because it was not there to be found.

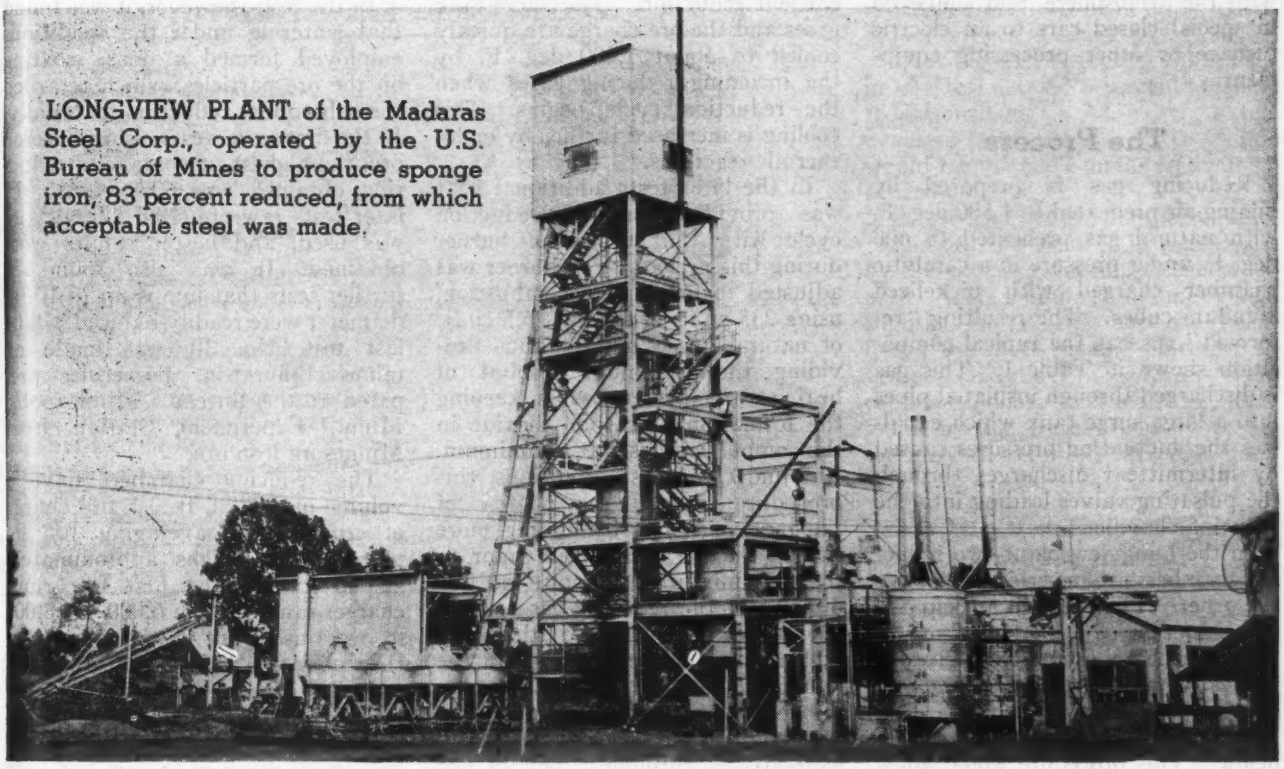
[1] Ibid, p. 111.

[1] Ibid, p. 208.

How Lost-Mine Tales Originate

Many lost-mine tales are due, I believe, to the exaggerated ego of a prospector, or supposed prospector. If one is of no particular consequence in a small community, what quicker way is there of achieving local notoriety than to claim that one has either lost a mine or found a lost mine? The specimens that are shown in proof are not difficult to obtain. Miners who work either at surface or underground in rich ore will often steal some pieces. Fancy specimens circulate from one to another by means of exchange, for a revolver, a pair of boots, a saddle, or something of equivalent value.

When I was at Coolgardie, in Western Australia, in 1897, a barkeeper showed me a handsome piece of gold-quartz or, more precisely, gold with a little quartz. I noticed that the metal was beautifully crystalline, and therefore the specimen had, to me, a special interest. I offered to pay gold value for the full weight of the specimen; that is, to pay for the attached quartz at its weight in gold. The barkeeper refused; he wanted double the gold value; and when I asked why, he replied, "You could sell a mine with that." True enough. Such specimens are used to excite interest in a supposed gold mine. They awaken greed. I remember a mass of quartz as large as a man's head, all bespangled with gold, from the Gordon mine, on exhibition at Leadville, in Colorado, in 1892. I saw men look at it while their hands trembled with the excitement of greed. Thus also a loafer in a saloon, when he pulls a rich specimen out of his pocket, will arouse the covetous instinct, and induce somebody to grubstake him. Many specimens have served this purpose. Moreover the tale of a lost mine makes good conversation and adds interest to a locality as a possible place for mineral discoveries. The local people do not ridicule the story, because it may bring others thither and stimulate search in the vicinity. Individuals and localities alike win notoriety by aid of such yarns. Thus the lost-mine story flourishes like an evergreen, to decorate the annals of mineral exploration in the waste places of the earth.



LONGVIEW PLANT of the Madaras Steel Corp., operated by the U.S. Bureau of Mines to produce sponge iron, 83 percent reduced, from which acceptable steel was made.

An Experiment in Making Sponge Iron

WHITMAN E. BROWN, *Engineer in Charge, Longview Project, U.S. Bureau of Mines, Washington, D.C.*

A product of fair grade (about 83 percent reduced) was made by the Bureau of Mines at the Madaras plant in Texas, but considerable alteration of the equipment would be necessary to determine optimum reduction and costs possible by the method used.

The sponge iron was melted without difficulty in an acid electric furnace to make acceptable steel, except for high phosphorus content, which is dependent upon the ore used.

Preliminary tests in two commercial wrought-iron plants indicated that sponge iron of the quality produced at Longview may prove a useful raw material for wrought iron.

DESIGNED for making sponge iron, the reduction plant of Madaras Steel Corp., Longview, Tex., was operated under lease on experimental work by the U.S. Bureau of Mines from November, 1942, until some time in February, 1944, when the work was discontinued. The process used, which will be described, is essentially the reduction of iron oxides by hot reducing gas prepared from natural gas and passed with a pulsating pressure through a chamber containing iron ore preheated to a temperature below the melting point of the charge. The hot sponge iron thus produced can be drawn from the reducing chamber, out of contact

Sections on testing of sponge iron at Boulder City, Nev., Penn Iron & Steel Co., and Ewald Iron Co., were prepared from unpublished reports by T. E. Evans, associate technologist; R. C. Buehl, supervising engineer, Metallurgy of Steel Section; and C. T. Anderson, assistant regional engineer, respectively.

with the atmosphere, and conveyed in special closed cars to an electric furnace or other processing equipment.

The Process

Reducing gas is prepared by mixing air preheated to 1,500 deg. F. with natural gas preheated to 600 deg. F. under pressure in a catalytic chamber charged with nickelized alundum cubes. The resulting "reformed" gas has the typical composition shown in Table I. This gas is discharged through insulated pipes into a large surge tank which equalizes the fluctuating pressures caused by intermittent discharges through the pulsating valves leading into the reducing chamber.

In the Longview plant two reducing chambers are in series, one above the other. Plant design anticipated the reduction of a charge of ore in the lower chamber and simultaneous preheating and partial reduction of a charge in the upper chamber by passage of the hot, spent gases from below. This procedure would allow semicontinuous, cyclic operation by dropping the partly reduced, hot charge from the upper chamber into the lower at the end of each reduction cycle. In the Bureau's tests, however, only "batch" runs, using the lower reducer exclusively, were made.

The reducing gas enters and leaves the reducing chamber through pulsating valves that operate at a 90 deg. phase from each other. With the upper or exit valve closed, the lower or inlet valve opens to admit gases from the surge tank until approximately 40 psi. pressure is developed in the reducer. Near this point the upper valve opens, and the spent gases are blown through the upper chamber and out the flue. In most of the tests six pulsations per minute were used, but it has been shown that this is not a critical factor.

In the work the ore charge in the reducing chamber was preheated by a burner in the surge tank. The burner is set for perfect combustion, using about 285 cu.ft. of air and 28.5 cu.ft. of natural gas a minute. The hot combustion gases flow through the surge tank and the charge-reducing chamber; at the end of the heating period the temperature of the surge tank reaches 2,000 to 2,100 deg. F. and that of the ore in the reducer about 1,800 deg. F.

One of the principal difficulties was that of providing sufficient heat throughout the run for quick, efficient reduction. The surge-tank gases and the ore charge are quickly cooled to about 1,200 deg. F. by the incoming reducing gases when the reduction cycle begins. This cooling is increased further by endothermic reactions.

In the later tests additional heat was provided for the reduction cycle with the surge-tank burner during this period. The burner was adjusted to incomplete combustion, using 235 cu.ft. of air and 26.5 cu.ft. of natural gas a minute, thus providing the maximum amount of heat to the system while keeping the formation of carbon dioxide in the combustion gases at a minimum. But under the best conditions, this procedure lowered the quality of the reducing gases by adding more carbon dioxide and water vapor to the gas mixture. In spite of this dilution of the reducing gases, however, the tests showed that the higher temperatures attained in the reducing chamber materially increased the percentage of reduction. Tests in which the reducing gases were passed through a bed of hot coke to reduce the carbon dioxide and water-vapor content before entering the reducing chamber resulted in some improvement in quality of gas but showed none in reduction of the ore.

Thirty Tests Made

After a study of the catalytic re-forming of natural gas with air to produce the required reducing gas, and necessary rehabilitation and adjustments in the plant equipment, actual reducing tests were undertaken. In all, 30 tests were made. The ore used for all except the last came from the North Basin area, near Linden, Cass County, Tex. An average sample of this ore, washed and crushed to minus-6 in., gave the following analysis: Fe, 50.1 percent; P, 0.105; S, 0.009; SiO_2, 10.08; Al_2O_3, 3.95; free moisture, 1.4; and calcination loss, 12.9.

In the early investigations the ore was prepared by crushing in a hammer mill to minus $\frac{3}{4}$ in., thoroughly mixed with 4 percent coke and 8 percent water, and sintered. The sinter was roll-crushed and sized to minus 1 in. plus $\frac{3}{16}$ in. to prepare it for the reducer. The minus-$\frac{3}{16}$ in. material was then rejected and stockpiled.

Sintering partly reduced some of the iron and converted the hydrous iron oxides to the magnetic oxide, Fe_3O_4. This, with the loss of volatile matter during sintering, increased the iron content to about 60 percent.

In the tests, however, it was found that sintering under the conditions employed formed a dense coating on the ore particles, which retarded the subsequent reduction materially. In the first seven tests, using sintered ore, the highest percentage of reduction obtained was 60 percent. In later tests raw ore sized $\frac{3}{4}$- to $\frac{5}{32}$-in. was used, and better results were obtained. It was also found in further tests that lumps up to 10 in. diameter were readily reduced. The last test, No. 30, was made on minus-2 plus-$\frac{1}{4}$-in. glomerules prepared at the Bureau's Minneapolis, Minn., Experiment Station from Minnesota iron ore.

The reducing chambers have a volume of 236 cu. ft. A full charge of crushed ore, averaging 106 lb. per cu. ft., weighs approximately 25,000 lb. In the first few runs, charges ranging from 6,000 to 18,000 lb. were used, but it was found that the pulsating blasts of the hot reducing gases entering the bottom of the reducing chamber caused a pulsation of the charge that not only pulverized much of the ore but blew a large part of it out of the stack, 60 ft. above the ore bed. In addition to this loss, pulverizing the ore caused fines to accumulate in the bottom of the reducing chamber, which plugged the gas inlet and caused dangerous back pressures in the reducing-gas system. In fact, this was one of the principal difficulties in the tests.

In obviating this difficulty, the first step was to give the reducing chamber a full charge of 25,000 lb. of ore. Even though the volume shrinkage during reduction was 25 percent, this additional weight in the vertical column eliminated the pulsating movement of the ore bed and materially reduced the formation of fines during reduction. The second and later step to avoid plug-

Table I. Analyses of Reducing Gases, Percent*

Constituents	Re-formed Gas as It Left the Re-formers	Heated Surge-tank Exit Gas
CO_2	1.7	2.7
O_2	0.4	0.4
H_2	29.7	26.2
CO	15.8	14.6
C_2H_6	0.2	0.3
CH_4	6.2	2.3
N_2	46.0	53.5
Totals	100.0	100.0

* Analyses are on dry basis. The surge-tank exit gas contains about 4 percent water vapor.

Table II. Reduction-Test Data

Weight of ore charge	25,000 lb.
Particle size of ore charge	minus ¾—plus $\frac{5}{32}$ in.
Total reducing time	1,335 min.
Total natural gas to re-formers	210,930 cu. ft.
Average a minute	158 cu. ft.
Total natural gas to preheaters	37,600 cu. ft.
Average a minute	28.2 cu. ft.
Total natural gas to surge tank burner	25,378 cu. ft.
Average a minute	19.0 cu. ft.
TOTAL NATURAL GAS USED IN TEST	273,908 cu. ft.
Total natural gas used a ton of metallic iron in sponge product	52,889 cu. ft.
Average air:gas ratio	2.5/1
Percent total iron in original charge	50.1
Percent total iron in sponge product	74.4
Percent metallic iron in sponge product	61.5
Percent reduction obtained in test	82.7
Weight of metallic iron in sponge product	10,368 lb.
Average temperature, reformer outlet	1,644° F.
Average temperature, surge tank inlet	1,387° F.
Average temperature, surge tank outlet	1,800° F.
Average temperature, reducer, middle	1,546° F.
Gas pulsations	3/min.

ging the bottom orifices was to charge large lumps of ore into the bottom of the reducer. This left a more open section there and eliminated much of the difficulty caused by plugging and back pressure in the gas system.

In one of the later test runs, 82.7 percent of the iron in the charge was reduced to metallic iron. In this test the surge-tank burner was used to heat the reducing gases before they entered the reducing chamber. As shown in Table I, this lowered the quality of the reducing gases slightly. Table II gives the data obtained and Table III shows the analysis of the sponge product obtained.

Some Observations

The following observations were made:

Sintering the ore charge to the degree attained is definitely detrimental to the reduction.

Percentages of reduction were as good with lumps of ore up to 10 in. in diameter as with small particles; the greater tendency for small particles to reoxidize during cooling may be a factor here. This applies only to the ore tested, dense ores in general not being as readily penetrated by reducing gases.

Use of comparatively large lumps of ore in the charge apparently solves the problem of fine ore plugging the gas inlet and the ore outlet in the chamber bottom. With large lumps, the crushing required in preparing the charge is reduced, which in turn results in less fine material in the prepared ore.

Material finer than $\frac{5}{32}$ in. should not be charged to the reducer because of the danger of plugging the gas inlet. One test on iron ore glomerules indicated that fines screened from the ore could be reduced satisfactorily after agglomeration.

The sponge iron produced had exceptionally good briquetting properties, and tests have shown that the 80-percent-reduced material is easily melted in an acid-lined electric furnace.

Continuous re-forming of large quantities of natural gas requires elimination of pressure fluctuations in the gas and air lines, as these changes upset the equilibrium of the re-former. Small leaks in the air and gas lines, it was found, soon render the re-former unfit for use. Difficulty in maintaining satisfactory operation of even one of the two gas re-formers was the most serious obstacle to attainment of optimum reducing conditions.

The reduced ore is likely to reoxidize if the slightest precaution in excluding oxygen is overlooked. If reoxidation occurs in the reducer bottom, enough heat is liberated by the reaction to fuse the sponge and block the discharge outlet. To prevent this, in some of the experimental work the charge was cooled in an atmosphere of natural gas before dumping.

Owing to the many mechanical difficulties experienced in operating the plant, particularly with regard to re-forming the natural gas, there was little opportunity to determine minimum reduction time and gas consumption under optimum operating conditions. In most of the significant tests the reduction was continued for about 20 hr. The shortest time in which fairly good reduction was attained was 12 hr.

The highest reduction obtained in any test was 82.7 percent, with a reduction time of 22⅙ hr. Later evidence indicated that 12 to 14 hr. would be adequate under equivalent test conditions.

In all calculations for percentage reduction, the metallic iron analysis by the mercuric chloride method was used. This method sometimes gives slightly low results but has been found the most reliable of the convenient analytical procedures. The copper sulphate method has been found by the Bureau usually to be seriously in error on the high side.

Table III. Analysis of Sponge Product, Percent

Total iron	74.4
Metallic iron	61.5
Percent reduction	82.7
Phosphorus	0.121
Sulphur	0.010
Carbon	1.55
Silica	12.86
Alumina	3.14

Sponge Melts Quietly

The melting qualities of the sponge produced have been determined by several tests. One-ton charges of the 80-percent-reduced material were heated in a standard 1½-ton, acid-lined, three-electrode, Moore Lectromelt furnace. Contrary to widespread belief, the sponge was not violently and highly reactive during melting but was remarkably quiet; the melt resembled that of a charge of iron turnings. There was no apparent damage to the furnace lining of any of the tests.

Data from three successive melting tests are given in Table IV. In each the sponge contained 74.4 percent total iron.

Carbon in addition to the approximately 31 lb. contained in the sponge iron was added in the first heat in the form of coke to prevent possible reoxidation and to protect the furnace lining from reaction with iron oxides. Scrap iron was also used in the first heat to assure an electric arc to begin the melting. Both precautions proved unnecessary and were omitted in the other heats.

During the early part of the melting period the sponge must be worked away from the sides of the furnace to prevent sticking.

There was no wild or vigorous frothing action during the melts, and

the process was always under control.

The high carbon content of the sponge (1.55 percent) required addition of iron oxide to the melt charge for decarburizing. The quantity of carbon, and also of silicon and manganese, in the product was easily controlled.

Phosphorus in the high-phosphorus ore used in the tests was not removed in the process.

Several castings poured from the melted metal were normal in every respect, except for the high phosphorus content.

Sponge Improved

As the high phosphorus and gangue material in the sponge iron render it undesirable as a raw material for steel-making by standard practice, tests were made at the Bureau's Experiment Station at Boulder City, Nev., to improve the quality of the sponge by a method closely resembling wrought-iron practice.

The method used is an adaptation of the process described by R. S. Dean in Bureau of Mines Report of Investigations 3229, 1934, "Direct Production of Wrought Iron," p. 49. It involves briquetting the sponge iron, heating the briquet to above the melting point of iron silicate but below that of iron, and hammering or rolling the heated briquets to squeeze out most of the molten slag.

With the equipment available at Boulder it was found that the furnace atmosphere and temperature control necessary to treat the briquetted sponge iron could be obtained best by using a molten slag resistance electric furnace. Several samples were briquetted cold in a hydraulic press, using a pressure of 12 tons per square inch, immersed in the basic silicate slag bath, and subsequently rolled or hammered to remove the slag and the phosphorus contained in the sample.

The sponge iron analyzed 75.7 percent Fe, 63.0 percent metallic Fe, 12.0 percent SiO_2, 5.7 percent Al_2O_3, 0.1 percent MgO, 0.180 percent P, 0.021 percent S, 0.13 percent Mn, and 2.3 percent total carbon. The slag used was made up by adding silica to iron ore from the Vulcan mine, in California, to make approximately the following composition: 55 percent Fe, 14 percent SiO_2, 1 percent Al_2O_3, 4 percent CaO, 3 percent MgO, and 0.10 percent P.

The optimum time and temperature of immersion of the briquets in the molten slag were determined to be 25 minutes and 1,325 deg. C. Under these conditions the slag-making constituents of the briquets became fluid, and the solid iron was readily worked in the subsequent squeezing operation. While the briquets were immersed in the high-iron oxide slag, the slag was covered with coke to regulate the furnace atmosphere. Careful atmosphere control was necessary, as too oxidizing a condition caused the slag to dissolve sponge iron, whereas too reducing a condition resulted in reduction of iron from the slag, thereby increasing the weight of metallic iron in the briquet.

A series of tests was made in which the hot briquets were rolled, but consistent reduction (roll adjustment was aimed at 75 percent reduction) could not be obtained because of the variable size and shape of the hot briquets. This resulted in wide variation in the amount of gangue removed. More consistent results were obtained in tests in which the briquets were forged in an improvised machine consisting of a pneumatic hammer of the Leyner rock-drill type mounted horizontally to strike along a table and against an anvil. The phosphorus removal ranged from 56 to 81 percent, and the gangue removal, calculated by difference in weight, from 62 to 85 percent. Best results were obtained in a test in which two briquets were joined while immersed in the heating slag and subsequently forged. The product of this test contained 3.69 percent acid insoluble and 0.049 percent phosphorus.

Table IV. Melting-Test Data

	Heat 1	*Heat 2*	*Heat 3*
TOTAL POWER USED	1,320 kw.-hr.	910 kw.-hr.	1,070 kw.-hr.
Power per ton of charge	927.3 kw.-hr.	880.2 kw.-hr.	985.9 kw.-hr.
Power per ton of metal	1,727.7 kw.-hr.	1,273.6 kw.-hr.	1,493.4 kw.-hr.
TIME OF HEAT	2½ hr.	1½ hr.	2½ hr.
FURNACE CHARGE			
Scrap	583 lb.	———	———
Sponge iron	2,000 lb.	2,000 lb.	2,000 lb.
Coke	100 lb.	———	———
Iron oxide	35 lb.	25 lb.	95 lb.
Sand	75 lb.	———	20 lb.
Limestone	10 lb.	———	———
Ferromanganese	14 lb.	12 lb.	25 lb.
TEMPERATURE OF POURING	3,100° F.	3,000° F.	2,930° F.
YIELD OF METAL	1,528 lb.	1,429 lb.	1,322 lb.
Metal recovery based on total iron in sponge and scrap	73.8 percent	96.0 percent	96.3 percent
ANALYSIS OF METAL, PERCENT			
Carbon	1.35	0.79	0.34
Manganese	0.77	0.59	0.98
Phosphorus	0.119	0.156	0.159
Sulphur	0.052	0.018	0.027
Silicon	1.15	0.75	0.68

Wrought Iron From Sponge

Preliminary wrought-iron-making tests have been made in cooperation with the Penn Iron & Steel Co., Creighton, Pa., and the Ewald Iron Co., Louisville, Ky, using Longview sponge iron instead of the usual pig iron as the raw material. Two test heats were made at each plant following quite closely their normal wrought-iron practice. In one heat at each plant the loose sponge iron as produced was used; the other was made on briquets prepared at the Bureau's Laramie, Wyo., pilot plant from Longview sponge iron.

Although all of the data on the products of these tests have not yet been obtained and evaluated, some observations may be of interest. The most noteworthy in favor of sponge iron is the short puddling time required, only about one-half that needed to puddle pig iron. The wrought iron produced from sponge iron contained more slag than usual. its rolling characteristics were poorer than normal, and the recovery of metallic iron was less than usually obtained from pig iron.

Results of these preliminary tests indicate that sponge iron may prove a desirable raw material for wrought iron, but that some departures from usual wrought-iron practice would be necessary to obtain high recovery of metallic iron and to make a product having the usual chemical and physical properties of wrought iron.

OPERATING IDEAS

Apparatus Improves Sampling of Cyanide Solution

FOR SAMPLING AUTOMATICALLY the pregnant solution in the cyanide plant and at the same time getting a sample the volume of which will be in direct proportion to the volume precipitated, as it should be for accuracy's sake, Malcolm Black, mill superintendent for Wright-Hargreaves Mines, Ltd., at Kirkland Lake, Ont., devised the apparatus here explained in text and illustrations. The press-tails solution flowing to storage is made to actuate a flush tank which in turn controls a non-automatic flush tank into which the pregnant solution flows and where it is sampled. That the volume of the sample is proportional to the volume of solution precipitated may be seen from the following description:

The press-tails solution going to storage discharges into a spill box (*A* in drawing), thence passing through a bottom pipe into the barren-solution storage tank. The solution will stand in the spill box at a level depending on the volume of flow—that is, the volume precipitated. On the side of box *A* is a smaller screen, *B*, connected by pipe to the former so that the solution stands in it at the same level as in box *A*. (The screen in this box serves to remove a froth.)

A swivel-jointed pipe, *C*, tapped into the side of screen box *B*, draws off the press-tails solution in a volume of flow that depends on the height of the solution in the spill box, this volume thus being proportional to the volume precipitated. (In calibrating, pipe *C* was raised or lowered until the head in spill box *A* was such as to fill automatic flush tank *D* in a given time when precipitating a given tonnage.)

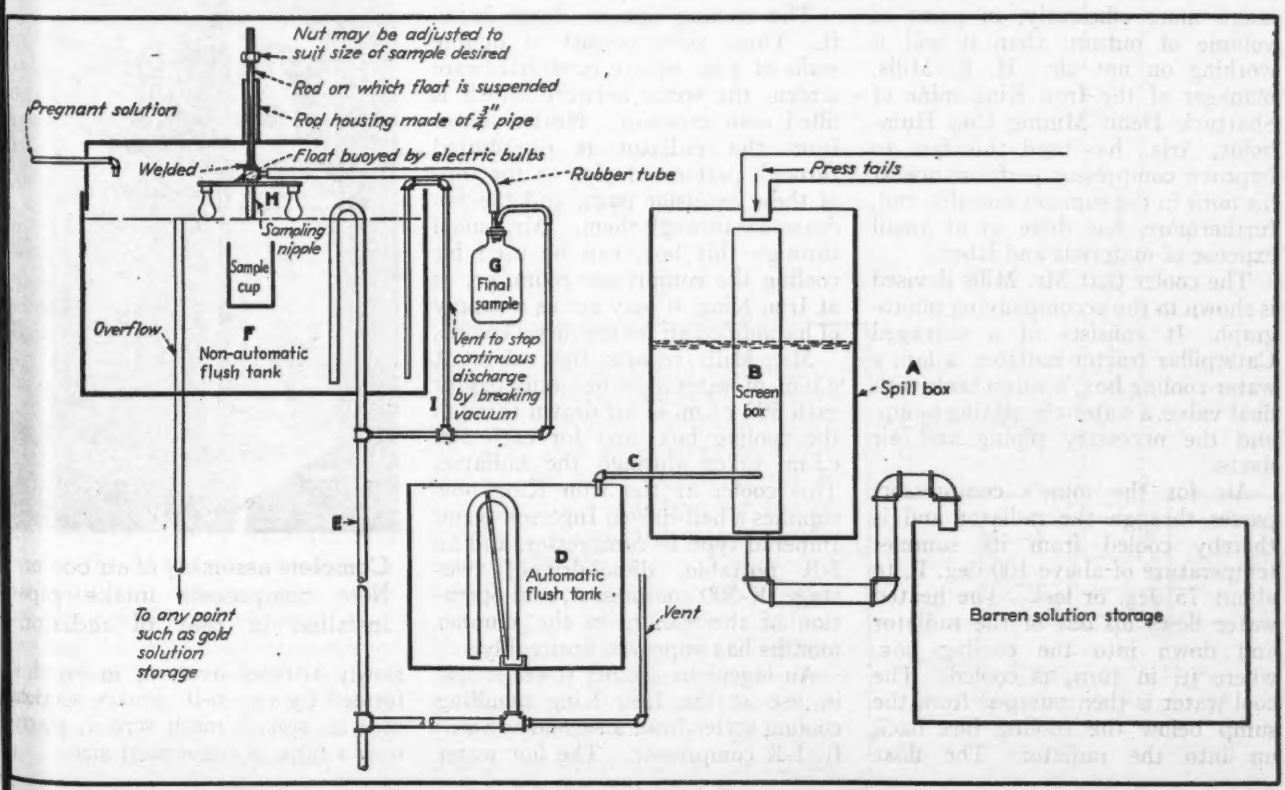
Automatic flush tank *D*, next in line, will thus fill from pipe *C* and be discharged with a frequency that is dependent on the head in the spill box *A*, and so on the volume precipitated. The press heads are sampled with the same frequency, as will be shown, so that the volume of the sample will likewise be proportionate to the volume precipitated.

Sampling of the press heads is effected as follows:

A portion of the press heads, or pregnant solution, flows continuously into non-automatic flush tank *F* and, as the tank fills, the sample cup shown fills likewise. Each time that the automatic tank *D* discharges, a vacuum is created in leg *E*, as well as in sample bottle *G*, due to the piping hook-up shown. This puts the sampling nipple attached to the float also under suction, and, when the float has dropped sufficiently as tank *F* empties, the nipple enters the sampling cup and the contents are sucked over into the jar. To prevent continuous discharge of this tank a vent pipe is provided at *I*. When its end is uncovered, the vacuum in leg *E* and the sample bottle *G* is broken and the tank *F* is ready for the next cycle.

The sampling nipple is $\frac{1}{8}$-in. pipe, but this is too large for satisfactory operation. Therefore, the end was closed with a little metal by an acetylene torch and a $\frac{1}{16}$-in. hole was drilled.

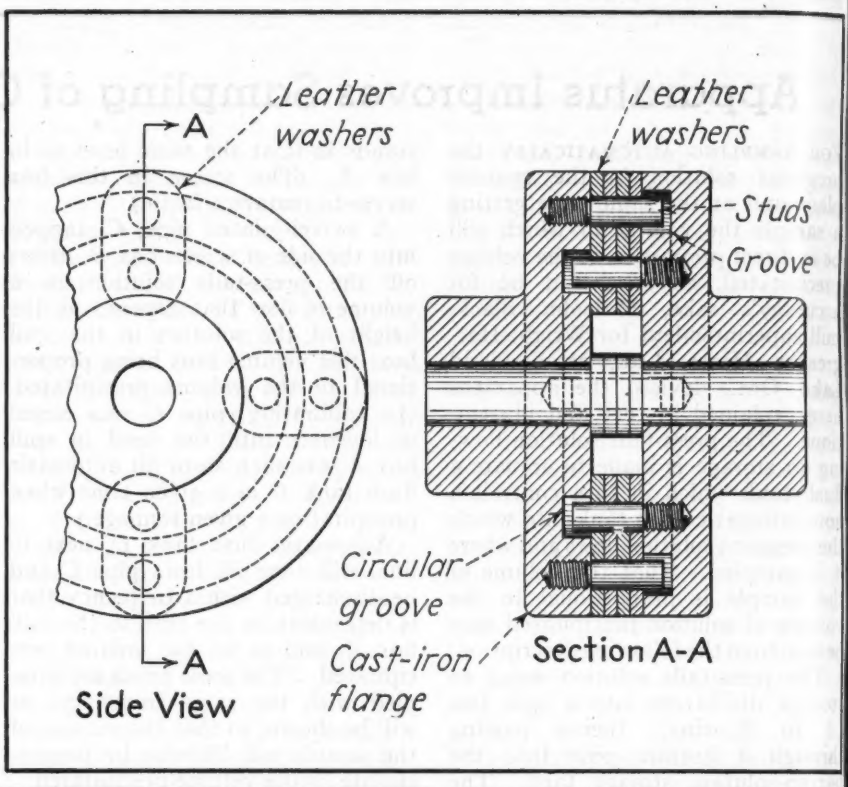
This apparatus was built around an already existing spill box and storage tank. There is no reason, however, why it cannot be adapted to almost any condition so long as the method employed includes a tank so placed that the head varies with the volume precipitated.



Shop-Made Coupling Protects Pump Motors

CONFRONTED RECENTLY with the task of providing a dependable flexible coupling for direct-driven sand pumps to eliminate twisted pump shafts and damage to bearings in the event of internal pump failure at the concentrator of Kennecott Copper Corp., Chino Division, Hurley, N. M., M. D. Simpson, mechanical superintendent, solved the problem satisfactorily by designing the coupling shown in the accompanying sketch. Its outstanding features are simplicity of design and rapidity of action in emergency.

The unit essentially consists of two machined cast-iron flanges, with a circular groove or channel and four steel studs on the face sides, keyed respectively to the motor and pump shafts, and a series of leather lock washers. Operation is simple. The moment a broken impeller or bearing failure freezes the pump shaft, the leather washers break and thus disengage the motor shaft. The protruding studs idle in the grooves until the motor is finally shut down.



Improvised Coolers Aid Air Compressor Plant

IF COLD AIR can be fed to a compressor intake, the machine will operate much more efficiently, in point of volume of output, than it will if working on hot air. H. F. Mills, manager of the Iron King mine of Shattuck Denn Mining Co., Humboldt, Ariz., has used this fact to improve compressor performance at his mine in the summer months, and, furthermore, has done so at small expense of materials and labor.

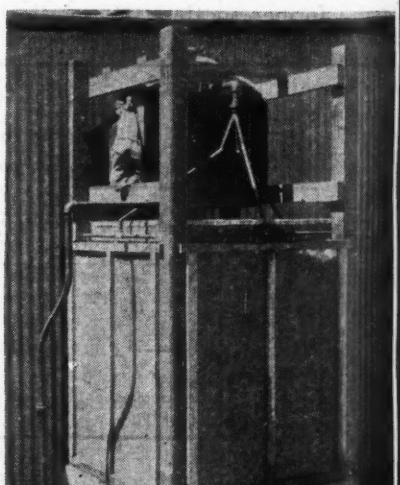
The cooler that Mr. Mills devised is shown in the accompanying photograph. It consists of a salvaged Caterpillar tractor radiator, a fan, a water-cooling box, a sump tank with float valve, a water-circulating pump, and the necessary piping and air ducts.

Air for the mine's compressors passes through the radiator and is thereby cooled from its summer temperature of above 100 deg. F. to about 75 deg. or less. The heated water flows up out of the radiator and down into the cooling box, where it, in turn, is cooled. The cool water is then pumped from the sump below the cooling box back up into the radiator. The float valve in the sump regulates the addition of make-up water.

The cooling box is about 3x3x4 ft. Three sides consist of double walls of ¼-in. square mesh hardware screen, the space between which is filled with excelsior. Heated water from the radiator is distributed through perforated pipe to the tops of these excelsior pads, and the fan draws air through them. Air, pulled through this box, can be used for cooling the compressor room, or, as at Iron King, it may act as a supply of humidified air for the diesel engine.

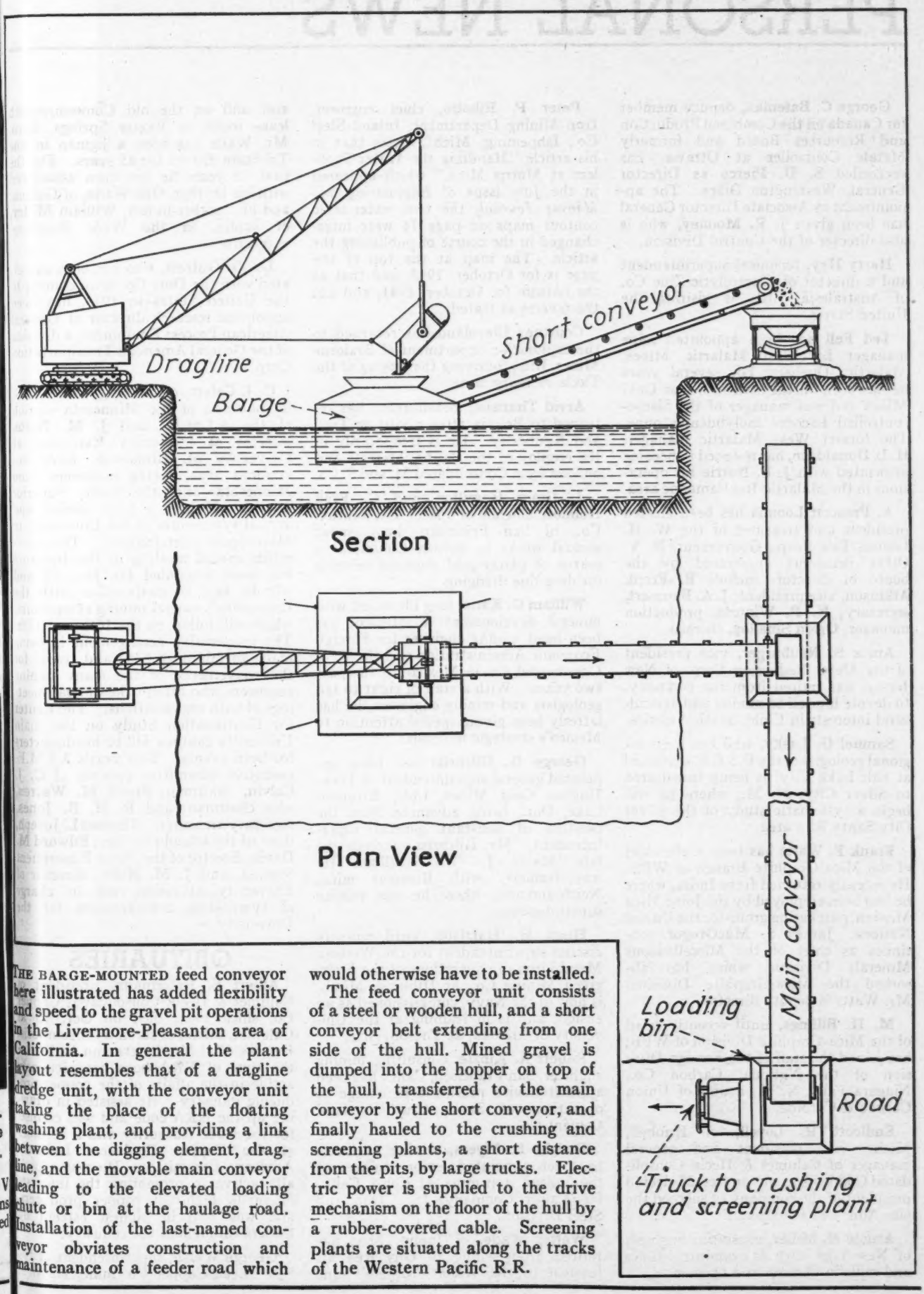
Mr. Mills reports that about 1 g.p.m. of water must be circulated for each 500 c.f.m. of air drawn through the cooling box, and for each 300 c.f.m. taken through the radiator. This cooler at the Iron King now supplies a belt-driven Ingersoll-Rand Imperial type 10 compressor, and an I-R portable, diesel-driven, two-stage, K-500 compressor, and operation of these units in the summer months has improved noticeably.

An ingenious cooling tower is also in use at the Iron King handling cooling water from a second 975 cu.-ft. I-R compressor. The hot water slowly trickles over an inverted V formed by two 6-ft. square sections of ¼-in. square mesh screen, placed over a tank of convenient size.



Complete assembly of air cooler. Note compressor intake pipe installed in rear of radiator.

Movable Feed Conveyor Mounted on Barge



THE BARGE-MOUNTED feed conveyor here illustrated has added flexibility and speed to the gravel pit operations in the Livermore-Pleasanton area of California. In general the plant layout resembles that of a dragline dredge unit, with the conveyor unit taking the place of the floating washing plant, and providing a link between the digging element, dragline, and the movable main conveyor leading to the elevated loading chute or bin at the haulage road. Installation of the last-named conveyor obviates construction and maintenance of a feeder road which would otherwise have to be installed.

The feed conveyor unit consists of a steel or wooden hull, and a short conveyor belt extending from one side of the hull. Mined gravel is dumped into the hopper on top of the hull, transferred to the main conveyor by the short conveyor, and finally hauled to the crushing and screening plants, a short distance from the pits, by large trucks. Electric power is supplied to the drive mechanism on the floor of the hull by a rubber-covered cable. Screening plants are situated along the tracks of the Western Pacific R.R.

PERSONAL NEWS

George C. Bateman, deputy member for Canada on the Combined Production and Resources Board and formerly Metals Controller at Ottawa, has succeeded **S. D. Pierce** as Director General, Washington Office. The appointment as Associate Director General has been given **J. R. Mooney,** who is also director of the Control Division.

Harry Hey, technical superintendent and a director of Electrolytic Zinc Co. of Australasia, Ltd., is visiting the United States.

Ted Fell has been appointed mine manager by West Malartic Mines, Malartic, Quebec. For several years he has been on the staff of Siscoe Gold Mines and was manager of the Siscoe-controlled Lacorne molybdenite mine. The former West Malartic manager, **H. L. Donaldson,** has resigned to become associated with **J. P. Norrie** for operations in the Malartic-Bourlamaque area.

A. Prescott Loomis has been elected president and treasurer of the W. H. Loomis Talc Corp., Gouverneur, N. Y. Other personnel announced by the board of directors include **R. Frank Atkinson,** vice president; **J. A. Baumert,** secretary; **N. P. Winters,** production manager; **Orton Smalley,** chemist.

Amos S. Neuburger, vice president of the Metal Reduction Corp. of New Jersey, has retired from the company, to devote himself to mining and agricultural interests in Chile, South America.

Samuel G. Lasky, who has been regional geologist of the U.S.G.S. stationed at Salt Lake City, is being transferred to Silver City, N. M., where he will begin a systematic study of the Silver City-Santa Rita area.

Frank F. Watts has been made chief of the Mica-Graphite Branch of WPB. He recently returned from India, where he had been employed by the Joint Mica Mission, purchasing group for the United Nations. **James S. MacGregor** continues as chief of the Miscellaneous Minerals Division, which has absorbed the Mica-Graphite Division. Mr. Watts is deputy director.

M. H. Billings, until recently head of the Mica-Graphite Division of WPB, has joined the staff of the Foreign Division of the National Carbon Co., Niagara Falls, N. Y., a unit of Union Carbon & Carbide.

Endicott R. Lovell, of Hubbell, Mich., vice president and general manager of Calumet & Hecla Consolidated Copper Co., was on Oct. 25 elected president of the company to succeed the late Albert E. Petermann.

Arnold H. Miller, consulting engineer of New York City, is examining mines and mills in Ontario and Quebec.

Peter P. Ribotto, chief engineer, Iron Mining Department, Inland Steel Co., Ishpeming, Mich., states that in his article "Handling the Water Problem at Morris Mine," which appeared in the July issue of *Engineering and Mining Journal*, the two water-table contour maps on page 74 were interchanged in the course of publishing the article. The map at the top of the page is for October, 1943, and that at the bottom for October, 1941, and not the reverse as stated.

Courtney Cleveland has returned to the exploration department of Bralorne Mines, Ltd., following the closing of the Takla mercury mine.

Arvid Thunaes, metallurgist, has returned to Bolivia after a visit to Trail and Kimberley. He is temporarily in the employ of the Patiño interests and on loan from Consolidated M. and S. Co.

J. Craig Hamilton and **C. Fred Holmes,** officials of Placer Exploration Co., of San Francisco, have spent several weeks in British Columbia in search of placer-gold deposits suitable for drag-line dredging.

William G. Kane, long identified with mineral development in Mexico, has been head mining engineer for Foreign Economic Administration and the U. S. Commercial Co. in Mexico for the past two years. With a staff of eight to ten geologists and mining engineers, he has latterly been giving special attention to Mexico's strategic minerals.

George G. Gilchrist has been appointed general superintendent of Teck-Hughes Gold Mines, Ltd., Kirkland Lake, Ont., being advanced from the position of assistant general superintendent. Mr. Gilchrist succeeds the late Major J. G. McMillan. He was formerly with Buchans mine, Newfoundland, where he was mining superintendent.

Hugh H. Harrison, until recently district superintendent for the Western Mesabi iron-ore operations of the Evergreen Mining Co., at Hibbing, Minn., is now in the Navy, commissioned as an ensign, and is in training at the University of Arizona, at Tucson, Ariz.

Robert A. Kinzie, consulting mining engineer, San Francisco, Calif., has been appointed vice president in charge of operations of Santa Cruz Portland Cement Co.

Dwight L. Myers, mining engineer, has been appointed senior engineer at the Vulcan iron mine, at Kelso, Calif., for Kaiser Company, Inc., Iron and Steel Division.

Walter Wade, of Joplin, Mo., has retired after selling to **Guy Rea** his interest in the Wade Brothers' mine and mill on the old Commonwealth lease south of Baxter Springs, Kan. Mr. Wade has been a jigman in the Tri-State district for 45 years. For the past 12 years he has been associated with his brother, **Otis Wade,** of Galena, and his brother-in-law, **William Miller,** of Joplin, in the Wade Brothers' enterprise.

Dr. G. Gutzeit, who has been associated with the Dorr Co. since coming to the United States in 1943, has been appointed research director of General American Process Equipment, a division of the General American Transportation Corp.

C. J. Calvin, of Hibbing, Minn., who is chairman of the Minnesota section of the A.I.M.E., and **J. M. Nolte,** director of University Extension at University of Minnesota, have announced that mining engineers from Minnesota and the Lake Superior district will hold a joint session and annual symposium at the University in Minneapolis next January. The eighteenth annual meeting of the Institute has been scheduled for Jan. 15 and will be held in conjunction with the University's annual mining symposium, which will follow on the 16th and 17th. The cooperative arrangement is being made to minimize time and travel for the convenience of the many mining engineers who attend the annual meetings of both organizations. The Center for Continuation Study on the main University campus will be headquarters for both events. This year's A.I.M.E. executive committee consists of **C. J. Calvin,** chairman; **Frank M. Warren,** vice chairman; and **R. H. B. Jones,** secretary-treasurer. **Thomas L. Joseph,** dean of the school of mines; **Edward M. Davis,** director of the Mines Experiment Station, and **J. M. Nolte,** director of University extension, are in charge of symposium arrangements for the University.

OBITUARIES

Albert E. Petermann, president of Calumet & Hecla Consolidated Copper Co. since 1941, died on Oct. 15 at Calumet, Mich., of coronary thrombosis. He was 67. Mr. Petermann had since the time of NRA been conspicuously active in the affairs of the copper-producing industry. He assisted in drawing up the NRA code and was counsel for the Code Authority and a member of the Copper Producers Industry Advisory Committee. He was especially active in promoting the interests of small, high-cost copper producers, and was held in highest esteem by leaders throughout the industry.

George Welsh, superintendent of the "79" Lead-Copper Co. mine, Hayden,

Ariz., was killed recently in an automobile accident near Winkleman, in that State. The "79" company is a subsidiary of Shattuck Denn.

Michael A. Stepovich, 69, well-known mining man of Alaska, died at his home in Los Gatos, Calif., Sept. 21.

Charles Spearman, for the last 25 years consulting geologist and mining engineer of Montreal, died in that city on Oct. 9 in his 64th year.

Russell Cryderman, Canadian prospector long active in the Sudbury, northern Ontario, and Manitoba districts, died in Sudbury on Oct. 10.

Guy Franklin Creveling, vice president and secretary of African Metals Corp., died at Hackettstown, N. J., on Oct 12 at the age of 54

Edward Newman Vance, 62, mica operator of Spruce Pine, N. C., died Oct. 11. At the time of his death he was head of the E. M. Vance Mica Co. and formerly was associated with the Colonial Mica Co. and Consolidated Mica Co.

Frank C. Perew, owner and operator of gold and tungsten mines in the West from 1900 until his retirement in 1938, died at Pasadena, Calif., on Oct. 20 at the age of 74.

Edward Brown, pioneer British Columbia miner, died in Vancouver Sept. 14. He was born in Iowa, coming west to Salt Lake City in 1882, and settling in Rossland, B.C., in 1896.

W. W. Graff, of Negaunee, Mich., prominent in the mining industry of the Lake Superior region for 40 years, and district superintendent of mines at Negaunee for Cleveland-Cliffs Iron Co., died on Oct. 9.

Arthur L. Thomas, Jr., 64, Salt Lake City, formerly associated with the Boston Consolidated Mining Co., builders of the Arthur mill of the Utah Copper Co., died Oct. 4 in Chicago, where he was attending a national safety council congress.

LETTERS

Holds for Maximum Balanced Trade

The Editor:

I READ WITH RELIEF and approval the letter of Mr. F. E. Lathe, of Ottawa, Canada, which appeared in your September number under the caption "Trade Overshadows Gold," in which he remarks upon "the almost universal desire to exchange the maximum of exports for the minimum of imports."

I have been amazed for twenty-five years at the apparently persistent refusal of the United States to accept its position as a creditor nation, which calls for an excess of imports over exports; the "favorable" balance is still an excess of exports!

There have always been philosophers who see in this kind of absurdity a weakness of democracy that leads to its ruin. Under universal suffrage the mass intelligence is not capable of adhering to sound principle and the people will eventually try to plunder each other through voting themselves money, or privileges worth money, out of the public treasury. Under our present policy of buying gold to encourage exports, to fight the depression, General Motors will sell an automobile in South Africa for gold to be buried at Fort Knox. General Motors profits by the trade, but South Africa does not contribute any of the goods and services which its stockholders purchase with that gold; the people of the United States do that! Yet all this is done by the actors with full honesty and propriety; the South Africans work hard to produce the gold, and nobody can complain that General Motors does anything other than praiseworthy in following its legitimate business.

But the result is barren—a sort of suspension of real trade, disturbing to the economies of the world and even to the gold miner. Everybody is either the victim or the (temporary) beneficiary of an unsound policy based upon the fallacious idea of trade—that it is profitable to export but injurious to import.

At this juncture of world affairs Mr. Lathe may be doing a great service by insisting that real trade is an exchange of goods and services. He would undoubtedly have added if he saw fit to enlarge upon the proposition that such trade is profitable on *both* sides; that the motive is enlightened and beneficent self-interest; that everybody in a civilized state is absolutely dependent upon trade, the more civilized the more dependent, till it is a fact that the right to take a drink of water is by virtue of a trade with the *whole human race;* because the world is an economic unit. This is so obvious that it ought to be a truism, yet in our modern discussions we are steadily moving away from it, as if people see more profit in obstructing trade than by furthering it; as if a conspiracy of "control" were better than plain dealing and a common sense of mutual advantage; as if one nation will profit by destroying another nation's trade.

It will be well, I think, in our discussion of peace to dwell upon this line of thought. J. R. FINLAY

Redlands, Calif.

"Old Mood" Nostalgia

The Editor:

AS A LIFE-LONG ADMIRER and reader of Mr. T. A. Rickard it made me downright sad to see him so ruthlessly deglamourize the "Lost Mine" tales, in your September issue. With a near sneer he quotes, "Such stuff as dreams are made of." And the poor ignorant "emigrant"! Not only addicted to drink but unaware of the fact that silver tarnishes, or that gold does not have such physical characteristics!

I hereby petition you to reprint his poem, "To the Memory of the Pioneers of American Mining" (*E. & M. J.*, Jan. 1, 1905; Vol. 79, p. 1), which begins—

"I have a toast: lift high the glass
To those old heroes who
First crossed the plains and found the pass
To make a way for you.

"Those Argonauts of yesterday
Whose Colchis dream came true;
Those voyageurs who cleared the way
More wisely than they knew."

I like his old mood better.

EDWIN S. BOALICH.

Washington, D. C.

On Selling Gold in India or Egypt

The Editor:

LEGISLATION to permit newly mined gold to be sold freely in foreign markets has been introduced in Congress. Doubtless this is due to published reports that gold has been sold in foreign markets at $80 an ounce. No doubt a merchant in India would rather have $35 in gold than $80 in U.S. paper money, which is not good until it has been returned to the U.S., but foreign buyers cannot pay for gold in U.S. currency unless they sell goods in this country. If the prospective buyers have the U.S. dollars, why should they offer more than $35 an ounce when the Treasury will redeem its currency at that price? I understand that the Treasury is not coining gold, but is settling adverse trade balances in gold bullion at $35 an ounce. If it did not do this, U.S. currency would be of no value in foreign countries, and, eventually, would lose its value in this country. When the price of gold was increased to $35 an ounce, the value and buying power of the dollar was lowered without increasing the value of gold. This caused a loss of wealth and buying power to creditors, and was one of the reasons for continued "pump priming."

ARTHUR B. FOOTE.

Grass Valley, Calif.

Editor's note:

Obviously if we expect to sell gold or anything else to foreign nations we must expect to receive their goods in exchange. There is not enough gold abroad to finance our export trade by gold balances for very long; also, continuation of the tendency to accumulate the world's gold in this country will militate against reestablishment of the gold standard, which is already finding strong resistance. As pointed out in our October issue (p. 117) the proposed legislation, if passed, would not benefit gold producers under current conditions, as it would be impossible to get their money out of India or Egypt. Also, if they should exchange it for goods in those countries with a view to bringing them here, they would find the goods more expensive than gold because of serious domestic price inflation in these countries.

MARKET SUMMARY

CONSUMPTION of major non-ferrous metals in the war production program was maintained at a higher rate throughout October than most observers thought likely, with the result that concern over postwar problems moderated. With stockpile legislation out of the way, that possible source of uncertainty has been removed temporarily as a factor that might affect business. Excepting tin and lead, stockpiles continued to grow during the last month.

Price developments were few and centered largely in quicksilver for spot and nearby delivery. As October ended spot metal was held at $113 to $115 per flask, which compares with $105 to $107 early in the month. So far as major non-ferrous metals were concerned, the price index continued at 88.74 for the 26th consecutive month.

Magnesium restrictions were lifted by WPB on Oct. 3, but producers were asked to continue furnishing monthly production reports. Production of magnesium during July amounted to 15,075 tons, whereas output during the first quarter of the current year averaged 20,500 tons a month. Aluminum production during July was 67,550 tons, against 84,800 tons in January this year. Further curtailment in output of the light metals is expected.

Industry advisory committees representing the copper, lead, and zinc groups were called to Washington to discuss problems that are expected to arise upon the cessation of hostilities in Europe. The cutback in copper requirements for war purposes in the first quarter after V-E Day is estimated at 35 percent. WPB wishes to maintain only those controls that will assure production of military and highly essential civilian items, industry members have been informed. Premium prices, ceiling prices, and manpower problems associated with production were topics reviewed.

The Government's stockpile of copper at the end of August contained 305,500 tons. New supply for August was estimated at 155,600 tons, of which United States mine output contributed 74,700 tons, according to the American Bureau of Metal Statistics. The expected total supply for the current year is estimated at 1,750,000 tons. Imports from Chile and other sources have been maintained at a high level. The latest statistics of Copper Institute place domestic production of refined copper for September at 88,384 tons, with deliveries (domestic and foreign copper) at 118,054 tons. Consumption of copper by fabricators during September totaled 129,444 tons, indicating that the trend among most consumers is toward lowering inventories. There

Major Metals

U.S. DAILY AND AVERAGE PRICES

1944 Oct.	Electrolytic Copper: Domestic (a) Refinery	Electrolytic Copper: Export (b) Refinery	Straits Tin: New York	Lead: New York	Lead: St. Louis	Zinc: St. Louis
2	11.775	11.700	52.000	6.50	6.35	8.25
3	11.775	11.700	52.000	6.50	6.35	8.25
4	11.775	11.700	52.000	6.50	6.35	8.25
5	11.775	11.700	52.000	6.50	6.35	8.25
6	11.775	11.700	52.000	6.50	6.35	8.25
7	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
10	11.775	11.700	52.000	6.50	6.35	8.25
11	11.775	11.700	52.000	6.50	6.35	8.25
12	Holiday	11.700		Holiday		
13	11.775	11.700	52.000	6.50	6.35	8.25
14	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
17	11.775	11.700	52.000	6.50	6.35	8.25
18	11.775	11.700	52.000	6.50	6.35	8.25
19	11.775	11.700	52.000	6.50	6.35	8.25
20	11.775	11.700	52.000	6.50	6.35	8.25
21	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
24	11.775	11.700	52.000	6.50	6.35	8.25
25	11.775	11.700	52.000	6.50	6.35	8.25
26	11.775	11.700	52.000	6.50	6.35	8.25
27	11.775	11.700	52.000	6.50	6.35	8.25
28	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25
31	11.775	11.700	52.000	6.50	6.35	8.25
		AVERAGES FOR MONTH				
Oct.	11.775	11.700	52.000	6.50	6.35	8.25
Oct.		AVERAGES FOR WEEK				
4	11.775	11.700	52.000	6.50	6.35	8.25
11	11.775	11.700	52.000	6.50	6.35	8.25
18	11.775	11.700	52.000	6.50	6.35	8.25
25	11.775	11.700	52.000	6.50	6.35	8.25
Oct.		CALENDAR WEEK AVERAGES				
7	11.775	11.700	52.000	6.50	6.35	8.25
14	11.775	11.700	52.000	6.50	6.35	8.25
21	11.775	11.700	52.000	6.50	6.35	8.25
28	11.775	11.700	52.000	6.50	6.35	8.25

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.225c. per pound, the average differential for freight and delivery charges.

(b) Export prices are net at refineries on the Atlantic seaboard and include sales of domestic copper in the foreign market. Owing to the World War and the disruption of normal trade relations, our export copper quotations, since September, 1939, have been based largely on f.a.s. transactions, ex United States ports. We deduct .05c. from the f.a.s. basis (lighterage, etc.) to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for Prime Western but not less than 1c. over the *Engineering and Mining Journal's* average quotation for Prime Western for the previous month.

Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

(c) Silver other than newly-mined domestic, by Handy & Harman, Under Treasury order of July 6, 1939, the price on domestic newly-mined silver mined subsequent to July 1, 1939, was fixed at 71.11c. per troy ounce. Handy & Harman's quotations on newly-mined domestic silver, 999 fine was 70⅝c. throughout October.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold in domestic and imported ore or concentrate is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

1944 Oct.	Sterling Exchange: "Checks" (Nominal)	Sterling Exchange: "90-day demand"	Silver (c): New York	Silver (c): London	Gold: London	Gold (d): United States
2	401.000	(f)	44.750	23.500	168s.	$35.00
3	401.000	(f)	44.750	23.500	168s.	35.00
4	401.000	(f)	44.750	23.500	168s.	35.00
5	401.000	(f)	44.750	23.500	168s.	35.00
6	401.000	(f)	44.750	23.500	168s.	35.00
7	401.000	(f)	(e)	(e)	(e)	35.00
9	401.000	(f)	44.750	23.500	168s.	35.00
10	401.000	(f)	44.750	23.500	168s.	35.00
11	401.000	(f)	44.750	23.500	168s.	35.00
12	Holiday	Holiday	Holiday	23.500	168s.	Holiday
13	401.000	(f)	44.750	23.500	168s.	35.00
14	401.000	(f)	(e)	(e)	(e)	35.00
16	401.000	(f)	44.750	23.500	168s.	35.00
17	401.000	(f)	44.750	23.500	168s.	35.00
18	401.000	(f)	44.750	23.500	168s.	35.00
19	401.000	(f)	44.750	23.500	168s.	35.00
20	401.000	(f)	44.750	23.500	168s.	35.00
21	401.000	(f)	(e)	(e)	(e)	35.00
23	401.000	(f)	44.750	23.500	168s.	35.00
24	401.000	(f)	44.750	23.500	168s.	35.00
25	401.000	(f)	44.750	23.500	168s.	35.00
26	401.000	(f)	44.750	23.500	168s.	35.00
27	401.000	(f)	44.750	23.500	168s.	35.00
28	401.000	(f)	(e)	(e)	(e)	35.00
30	401.000	(f)	44.750	23.500	168s.	35.00
31	401.000	(f)	44.750	23.500	168s.	35.00
			AVERAGES FOR MONTH			
Oct.	401.000	..	44.750	23.500	..	35.00
			AVERAGES FOR WEEK			
4	401.000	..	44.750	..	..	
11	401.000	..	44.750	..	..	
18	401.000	..	44.750	..	..	
25	401.000	..	44.750	..	..	

Calendar week averages, New York Silver: Oct. 7th, 44.750; 14th, 44.750; 21st, 44.750; 28th, 44.750.

(e) Not quoted (Saturday). (f) No quotation.

were no price developments during October. Some foreign contracts are due to expire at the end of 1944.

Stocks of slab zinc in the hands of Metals Reserve Co. at the end of June amounted to 210,000 tons, of which quantity some 60,000 tons consisted of Prime Western. Stocks reported by the American Zinc Institute at the end of September totaled 243,749 tons against 143,510 tons at the end of 1943. Deliveries of zinc to consumers have averaged around 65,000 tons a month in recent months, but consumption or use of the metal probably exceeded 70,000 tons, indicating that fabricators are more inventory minded under prevailing uncertain conditions.

Foreign lead is being drawn upon heavily to supplement domestic production in this period of high consumption. The stockpile of lead has dropped to around 120,000 tons. Sentiment in lead circles is almost uniformly optimistic. October needs were estimated at 70,000 tons, of which total domestic producers of refined lead are not expected to contribute more than 45,000 tons. The price structure in lead is regarded as firm.

Production of tungsten ore is declining, which tends to support prices in a less active market.

Miscellaneous Metals Monthly Averages

Average prices of miscellaneous metals for September and October.

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average producers' and platers' quotations, (e) Special shapes sold to platers.

	Sept.	Oct.
Quicksilver, N. Y. flask	104.280	109.200
Antimony (a)	15.839	15.839
Antimony, bulk, Laredo	14.500	14.500
Antimony, bulk, N. Y.	15.265	15.265
Antimony, Chinese (b)	16.500	16.500
Platinum, oz. troy	35.000	35.000
Cadmium (c)	90.000	90.000
Cadmium (d)	92.500	92.500
Cadmium (e)	95.000	95.000
Aluminum ingot	15.000	15.000

E & M J Price Index

Weighted index of non-ferrous metal prices (copper, lead, zinc, tin, silver, nickel, and aluminum). The average for the years 1922-1923-1924 equals 100.

1929	110.33	1936	73.45
1930	82.87	1937	90.86
1931	60.20	1938	73.67
1932	48.26	1939	77.71
1933	59.79	1940	79.22
1934	69.59	1941	83.49
1935	74.66	1942	86.80
		1943	88.74

	1942	1943	1944
January	85.39	88.74	88.74
February	85.90	88.74	88.74
March	85.90	88.74	88.74
April	85.90	88.74	88.74
May	85.90	88.74	88.74
June	85.90	88.74	88.74
July	85.90	88.74	88.74
August	85.90	88.74	88.74
September	88.74	88.74	88.74
October	88.74	88.74	88.74
November	88.74	88.74	....
December	88.74	88.74	....

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York, unless otherwise stated
(Nov. 1, 1944)

MISCELLANEOUS METALS

Aluminum, ingot, 99 plus per cent, lb.	15c.
Antimony, domestic, spot, lb. 5 tons or more	15.839c.
Bismuth, ton lots, lb.	$1.25
Cadmium, commercial sticks, lb.	90c.
Calcium, lb., ton lots, 97 @ 98 per cent	$1.25
Chromium, 97 per cent grade, lb.	89c.
Cobalt, 97 to 99 per cent, per lb.	$1.50
Indium, troy oz.	$7.50
Nickel, electrolytic cathodes, lb.	35c.
Magnesium, 99.8 per cent, carloads, lb.	20½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation) troy oz.	$35.00
Quicksilver, flask of 76 lb., 100 flasks or more	$113.00
Selenium, 99.5 per cent, lb.	$1.75
Silicon, minimum 97 per cent, spot, carloads, lb.	14.75c.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$12.50 nom.
Titanium, 96 to 98 per cent, lb.	$5.00

METALLIC ORES

Beryllium Ore, 8 to 12% BeO, f.o.b. mine, per unit	$14.50
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry, 48% Cr_2O_3, 2.8 to 1 ratio	$41.00
48% Cr_2O_3 3 to 1 ratio	$43.50
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$4.75
Mesabi bessemer	$4.60
Old Range non-bessemer	$4.60
Mesabi, non-bessemer	$4.45
Lead (Galena) 80 per cent, Joplin, Mo., ton	$76.01
Manganese, Metals Reserve Co. sales price, per long-ton unit of Mn contained, 48 per cent, subject to premiums and penalties, effective May 15, 1944: 85c. (duty paid) New York, Philadelphia, Baltimore, Norfolk, Mobile, and New Orleans; 91c., Fontana, Calif., Provo, Utah, and Pueblo, Colo.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	45c.
Tungsten Ore, per unit of WO_3:	
Chinese, 60 per cent, duty paid	$24.00
Domestic, 60 per cent and upward	$24.00@$25.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 per cent concentrate, Joplin, Mo.; per ton	$55.28

(a) Prices at mines, small lots, normally several dollars less.

METALLIC COMPOUNDS

Arsenic Oxide (arsenic) lb.	4c.
Cobalt Oxide, 70 @ 71 per cent, lb.	$1.84
Copper Sulphate, 100 lb.	$5.00

ALLOYS

Beryllium Copper, 2.5 to 3 per cent Be, per lb. of contained Be	$15.00
Ferrochrome, 65 @ 70 per cent per pounds of Cr. contained	13c.
Ferromanganese, 78 @ 82 per cent, gross ton	$135.00
Ferromolybdenum, 55 @ 65 per cent Mo, lb. of Mo. contained	95c.
Ferrosilicon, 50 per cent, per lb. of contained Si	6.60@8.10c.
Ferrotungsten, 75 @ 80 per cent, lb. of W contained	$1.90
Ferrovanadium, per lb. of V, delivered	$2.70@$2.90
Silicomanganese, 1 per cent C, gross ton	$133.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canadian (Quebec) mines (U.S. funds), ton:	
Crude No. 1	$650@$758
Crude No. 2	$165@$385
Spinning fibers	$124@$233
Paper stock	$44@$49.50
Shorts	$14.50@$26.50
Vermont, f.o.b. Hyde Park:	
Shingle stock	$62.50@$65.00
Paper stock	$44.00@$53.00
Shorts	$14.50@$28.50
Floats	$19.50
Barytes, long ton:	
Georgia, crude	$8.50@$9.00
Missouri, 93 to 94 per cent Ba SO_4	$8.25@$8.50
Bauxite, long ton:	
Domestic, crude, 50 @ 52 per cent (not dried)	$5.00
Domestic, chemical, 55 @ 58 per cent	$7.50@$8.50
Domestic, abrasive, 80 @ 84 per cent	$16.00
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, bulk	$6.75@$8.00
Delaware, No. 1	$15.00
Feldspar, bulk, ton:	
Potash feldspar, 200 mesh	$17.00
Glass spar, white, 20 mesh	$11.75
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois 60 per cent, all rail movement, ton	$30.00
Acid 98 and 1 per cent, bulk, ton	$37.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, f.o.b. Washington	$22.00
Mica — Colonial Mica Corp., agent for Metals Reserve Co., offered to buy No. 1 and No. 2 domestic sheet mica, 1½ and 2 in. and larger, full trim, at $8 per pound from Aug. 7 to Dec. 31, 1944. Those who wish to sell on a three-quarter trim basis will obtain $6 per pound, as previously stated.	
Ocher, Georgia, ton	$19.00@$22.00
Pyrites, Spanish, per long ton unit of s, c i f. Atlantic ports	12c. nom.
Silica, in bags, 325 mesh, ton	$20.00@$40.00
Sulphur, Texas, mines, long ton	$16.00
Talc, f.o.b. works, ton:	
New York, double air-floated, 325 mesh	$12.00@$15.00
Vermont, extra white, 200 mesh	$9.50@$10.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50
200 mesh, cream colored	$26.00

IRON AND STEEL

Pig Iron, Valley furnaces, gross ton: Basic	$23.50
Steel, base price, Pittsburgh Billets, gross ton	$34.00
Structural shapes, 100 lb.	$2.10

WASHINGTON REFLECTIONS

McGRAW-HILL WASHINGTON NEWS BUREAU

Premium-Quota Plan Is Likely to Be Retained

Washington is torn between the necessity for war production right now and plans for the reconversion of industry to take place on that day in the future when victory in Europe is final. Progress in the digestion of plans to be put into effect on V-E Day was being made in mid-October. The 40 percent decline in the rate of war production in the first year after V-E Day still remains the official estimate of the cutback that will be made. Many Washington observers are of the opinion that curtailments will actually be more than half of the production of military goods. However, the announced speeds with which the cutbacks in production will occur are expected to be less than will actually develop.

Relaxation in government control depends upon war production requirements. Delays in the military campaign in Europe may mean new programs for military equipment in this country. If new programs are necessary, they will prevent a relaxation of government control of industry for some time. An official estimate of the situation is that some of the war requirements may disappear before Germany is defeated but that new requirements will appear and the net change will be little, if any.

In regard to the production of metals, the official attitude in October was that as long as production of marginal mines is needed the premium-quota plan will be carried out by the War Production Board. Up to the beginning of November there was no clear-cut official policy in regard to the continuance of payments on "B" and "C" quotas. At that time, the ideas of those who believed that the "C" quotas should be retained had prevailed over those who believed that "C" quotas should be cut because of constantly mounting stockpiles.

The future course of the War Production Board's premium price policy may be influenced by the past experience in war production. In analyzing why certain military programs were behind schedule, it was found that where the program had called for a decrease in production some time ago, industry had not been able to regain that lost production when the military situation made an increase desirable at a later date. Result is a noticeable reluctance on the part of the War Production Board to make any cuts while there is the slightest possibility that increased schedules may be needed later.

Underlying reason for the inability of industry to meet increased production goals, particularly in programs that have been previously cut, is shortage of manpower. When labor forces have been allowed to drift away following cutbacks in schedules, it has been impossible to replace the lost workers. Washington observers believe that this situation may have a very definite bearing on the War Production Board policy in regard to metal production and particularly the continued payment of high premiums on marginal mineral output.

Loans Available Before Revocation of L-208

Official attitude and policy of the Reconstruction Finance Corporation with reference to current applications for the development and operation of gold mines is as follows:

"Prior to the withdrawal or rescission of WPB Order L-208, or such other orders or government restrictions with respect to priorities on materials and equipment and the availability of manpower, RFC will receive and consider applications for the development and operation of gold mines. Such applications should be prepared and submitted in the usual form and manner through the field offices.

"With respect to loan commitments made prior to the withdrawal or modication of WPB Order L-208 and the other restrictions referred to above, no disbursement will be made until such restrictions have been withdrawn or modified. RFC will reserve the right before authorizing disbursement, when the restrictions have been withdrawn or modified, to reconsider the loan or possibly re-examine the properties for the purpose of determining whether any substantial change in circumstances or security has developed or taken place. All such loans are to be made under authority of Section 14, Public Law 417, 73rd Congress, as amended, and under such terms and conditions and with such maturities as the RFC may determine."

Few Minerals Remain In Shortage Category

Swan song of WPB's Conservation Division, which was dissolved on Nov. 2, is the fourteenth and final issue of the Material Substitutions and Supply List. Further publication of this list is considered unnecessary because of the general easing of most of the important materials and metals. Metals themselves in many instances are in much better supply than are the fabricated and semi-fabricated shapes.

Only cadmium, chromium metal, sodium, tin, and nickel, including monel metal, remain in Group I, materials in insufficient supply for war plus essential industrial demands. Newcomers in Group I among the metals are steel castings and wire rope. Columbium has moved from Group I to Group II, while tantalum and zinc are now listed in Group III. Mica, graphite, and quartz crystals are in freer supply than they were, according to the list.

Commenting on the possibilities of the material outlook after V-E Day, the Conservation Division stated that when the German collapse arrives, large cutbacks should change favorably the materials situation as it is recorded in the final issue of the Material Substitutions and Supply List. The Conservation Division expects a few materials to remain scarce after V-E Day. Tin is the only metal in this category, which includes certain textile fibers, some of the fuels, and a few chemicals such as rubber, rotenone, and pyrethreum. Corundum is also expected to remain in short supply.

Review of the work carried on by the Conservation Division during its 28 months of existence as a WPB unit indicates that its work in simplification and standardization will outlast many of the substitutions of materials it sponsored. Relatively few of the many substitutions devised by the Division's technical staff are expected to remain the standard practice when materials are again available in normal supply. The substitutions that will remain in effect for the most part fall into the category of first applications of new materials which probably would have been made eventually, such as the use of plastics instead of metal in certain applications. The work of the Conservation Division merely speeded the adoption.

The Division's staff of more than 150 engineers who averaged 23 years of industrial experience developed a pool of technical information upon which industry could draw. This technical information, available to all comers, gave manufacturers confidence in many of the suggested substitutions and speeded their adoption.

Experts of the Conservation Division believe that lead base babbitt metal which was substituted for tin babbitt will continue to be used after the war because it does its job and costs appreciably less. These experts also see a good future for low tin content solders.

Establishment of the National Emergency Steel Specifications was another of the Division's accomplishments which may well live beyond the war. This entailed both the Division's specification-prescribing function, its substitution and its simplification function, for the NE steels did the work of many specifications and cut down on the use of certain critically scarce alloys.

Tin Outlook Discussed By WPB Division Head

Tin supplies of this country and the United Nations are low but not alarmingly so. Instead of what was rumored to be a stockpile of huge proportions, the United States has on hand about a year and a half supply. There is enough tin in our stockpile to take care of our present needs and carry us along until all sources are producing in the postwar period but not enough to permit any additional uses than are allowed at this time. Notions to the contrary were quickly deflated by the facts and figures presented to the National Metal Congress at the Oct. 17 meeting in Cleveland in an address delivered by Erwin Vogelsang, Director of the Tin-Lead-Zinc Division of the War Production Board.

For the first time since the war started figures on the production, consumption and supply of tin were brought out from under the blackout of Army censorship. Information Mr. Vogelsang was permitted to make public gives the combined government and privately owned stockpile on Jan. 1, 1942, as 143,000 tons. By the end of this year (Jan. 1, 1945) stocks are expected to be reduced to 113,000 tons. During the same period imports of pig tin and concentrates amounted to 144,000 tons. In the same three years consumption of tin from all sources (primary and secondary) amounted to approximately 257,000 tons.

History will repeat itself, according to Mr. Vogelsang, who predicted that tin would be under allocation control for some years after Japan is defeated, just as it was after the close of hostilities in the first World War. As he expressed it:

"Immediately after this war, much of the raw material of the world as well as domestic production, if any, plus the possible release of surpluses not needed for postwar government stockpiles, will be available to industry. However, such is not the case with tin. When the war with Japan is ended, it will take some years before the great number of dredges are rebuilt or replaced and before the tin smelters are once again functioning normally. Thus for a considerable length of time there will trickle into the world markets from the Far East only that tin which can be produced by hand-mining or sluicing operations in Malaya, Siam, and Netherlands East Indies and smelted in temporary plants. Contrary to some opinion, there are no indications that Japan has built up huge reserves of pig tin from the operations of Malayan, Siamese, or Netherlands East Indian tin mines. A very small tonnage of tin will continue to be available from China.

"We may therefore expect that tin will be under some form of control for a period after hostilities cease, if we are to avoid chaotic conditions in the supply, price, and demand for this metal. In the meantime the postwar demands, both here and in the liberated countries, for tin to be used in tinplate for food containers, for rehabilitation of plants in the form of babbitts, bronzes, solders, and for current consumptive purposes will impose a terrific strain upon the small supplies of the United States and of Britain."

This opinion is confirmed by the WPB Conservation Division's final Material Substitutions and Supply List, in which the prediction was made that of all the metals only tin would be scarce in the postwar period. One of the difficulties in bringing world production back to its prewar level was not brought out in the speech. If the Japanese thoroughly wreck the mining equipment, production in Malaya may not rise to its former level. Many of the properties may be too nearly worked out for the remaining ore to support installation of a new dredge. It is expected that interests may be pooled where adjoining properties together have sufficient reserves to justify a new installation. This would result in fewer properties being in production at one time. Properties too remote for joint action will be abandoned unless the remaining reserves are large enough to support the installation of new equipment of conventional design. The alternative is the development of portable machines that can be dismantled, moved, and reassembled cheaply.

Tin from other sources may not again be available in either war or prewar quantities. As Mr. Vogelsang explained, "It is expected our tin supply from the Belgian Congo will decline after the war, since the natives of the Belgian Congo will again be attracted to gold mining operations in the postwar period. Bolivia probably has passed its peak as a source of tin, and while new treatment processes may result in greater recovery of the tin contained in Bolivian ores, these methods will only serve to make less precipitate the decline in that country."

Surplus War Plants Are Being Offered for Sale

Few mines, mills, smelters, or refineries are to be found in the recently distributed briefalog in which the Defense Plant Corporation lists many of its properties which will become surplus and made available for sale to the public.

There are 879 Defense Plant Corporation projects listed and 94 that are War Department owned. This, then, covers approximately one-half of the government-owned plants and sites that will eventually be put on the market.

Industrialists may find desirable properties for their future operations in this list, although the plants may not be operating in their field at the present time. The fact that the present operator may have an option to purchase the plant should not discourage investigation. Many of these options will not be taken up because the option terms are not as favorable as the purchaser might be able to get by negotiation.

Defense Plant Corporation is sending copies of the briefalog to RFC agencies, banks, chambers of commerce, railroads, and other places where they will remain on file for the benefit of local industrialists. Contact should be made locally and detailed information secured through the regional offices of the RFC.

Mine Machinery Order Will Probably Remain

Effect of the plans for reconversion on the three War Production Board orders which have the greatest effect on the mining industry was generally known prior to the election, although many of the exact details were lacking.

The gold mine order, L-208, is one of WPB's control orders slated to be revoked on V-E Day. This is practically a firm promise made to the mining industry, although the orders that are on the list of those to be revoked are not available for publication.

The controls exercised over maintenance, repair, and operating supplies under order P-56 and the controls on the allocation of mining machinery through order L-269 are expected to remain in effect after V-E Day. Mining machinery will continue to be tight and export demands to be such that controls will be an absolute necessity to assure that the domestic mining industry can be supplied. There is a possibility that a new order may be written to take the place of both P-56 and L-269, combining features of each order that are to be retained.

The problems involved in the control of mining machinery are becoming easier. At one time the distribution of as many as 500 items were scheduled. There are now fewer than 25 in this category. The changes have come rapidly and items that were in very short supply only a few months ago are now available on the open market. Compressors, for example, are no longer scheduled.

The danger of foreign countries buying a sufficient amount of equipment to cause a domestic shortage is very real. In fact this has happened in a number of instances already. The retention of the scheduling machinery is a necessary protection to fair and equitable distribution of available supplies at home and abroad.

Controls that will be kept in use will conform to the policy laid down by the President. Under this policy friendly nations must receive the same treatment as domestic industry considering the conditions in both countries. The needs for mining machinery by the Russians, and by the Dutch, and the English, are staggering. It is estimated that Russia alone could absorb the entire output of this country's coal mining machinery for a period of two or three years in the rehabilitation of the coal mines that were destroyed during the German occupation.

(*Continued on page* 136)

NEWS OF THE INDUSTRY

Longhorn Smelter Produces 30,000 Tons of Tin a Year

In reviewing the position of tin, Erwin Vogelsang, director of the Tin, Lead, and Zinc Division of WPB, declared that he expects some form of control in the metal to continue after hostilities cease, to avoid chaotic conditions in supply, price, and demand. Data presented by the WPB official before the National Metal Congress, in Cleveland, Oct. 17, disclosed that the Texas tin smelter is producing the metal at the rate of "just over 30,000 long tons per year."

Domestic mine production of tin contributed only 8 tons of the metal to our supply in 1943, which supports the opinion of experts that no commercial deposits of the metal exist in this country.

The government smelter in Texas has been dependent chiefly on Bolivia for its supply of concentrate, Mr. Vogelsang said, but tonnages have been obtained from the Belgian Congo, French Cameroons, and one or two other sources. Belgian Congo concentrate first arrived in 1943, when production in that area exceeded the capacity of the local smelter. This concentrate averaged between 72 and 75 percent tin.

Imports of pig iron and tin contained in concentrates for 1944 are estimated by WPB at 50,000 tons, which compares with 38,000 tons in 1943 and 56,000 tons in 1942. New supply from domestic sources consists chiefly of secondary tin recovered from tin-plate scrap and used cans, and tin obtained from lead-base and other alloys. Details on production of secondary tin were not divulged.

Consumption of pig tin in the United States during 1944 is expected to exceed the new supply, and Mr. Vogelsang was permitted to state that the estimated deficit for the year will be between 12,000 and 13,000 tons.

Consumption of primary and secondary tin and tin contained in alloys during the first half of 1944 was 44,668 tons, which compares with a total for all of 1943 of 81,840 tons. Consumption of tin in the Jan.-June period this year, by products, was: Tin- and terneplate, 11,851 tons; brass and bronze, 17,597; solder, 6,593; babbitt, 4,448; tinning, 1,667; collapsible tubes, 256; foil, 200; type metal, 417; chemicals, 29; pipe and tubing, 103; other uses, including exports, 1,507; total, 44,668 tons.

Combined government and private stocks of tin on Jan. 1, 1942, totaled 143,000 tons. On July 1, 1944, the stocks amounted to 123,000 tons. Army censors withheld further details from the statement of stocks. The over-all stocks, Mr. Vogelsang said, have not dropped this year as badly as feared, because of the fortunate purchase of a substantial tonnage of Patino concentrates originally destined for England. In reference to the stockpile, he pointed out that Navy stocks are not available to industry except for special Navy requirements, and tin owned by the Treasury can be released only on Presidential authority.

Production of tin at the Texas City smelter during the first six months of 1944 amounted to 14,534 tons. This compares with an output of 20,727 tons for all of 1943 and 15,695 tons from April, 1942, when operations began, to the end of that year. About 90 percent of the Jan.-June output this year was Grade A tin.

Touching on postwar tin smelting in this country, Mr. Vogelsang reminded those attending the meeting that because of international agreements and political and commercial control the flow of concentrates to smelters in the prewar period was closely controlled. Unless changes are made in restrictive laws and corporate controls, he said, there appears little likelihood that Americans can secure a sufficient supply of raw material to feed a domestic tin smelter.

N. W. Mining Association To Celebrate Anniversary

The Northwest Mining Association has announced plans to celebrate its golden anniversary in Spokane, Wash., on Dec. 1 and 2, and will discuss the importance of gold and silver in world-wide finance and economy. For the occasion, Charles E. Marr, president of the association, has appointed a convention committee of past presidents consisting of James Leonard, Bliss Moore, Roger Oscarson, and C. O. Dunlop, who will arrange the program. J. B. Haffner, manager of Bunker Hill, was named chairman of the finance committee.

Colonial Mica Announces New Purchase Commitment

In line with its policy of keeping domestic producers informed of its future commitments to purchase mica, Colonial Mica Corp., agent for Metals Reserve Co., has announced its commitment for the first three months of 1945. On recommendation of the War Production Board the corporation will purchase during the period only domestic mica of the following categories: Full-trimmed domestic muscovite ruby sheet mica, large enough to cut 1½x2 in. or larger, of first and second domestic quality, $8 per pound; domestic punch mica, 30¢. per pound.

These prices refer to ruby mica only. Green mica and black stained mica will be eliminated from the corporation's program after Dec. 31, 1944. Sheet mica too small to get a rectangle 1½x2 in. will not be purchased except in the form of punch mica. Producers interested in other details can obtain a copy of the announcement and a full description of specifications on application to Colonial Mica Corp., 141 Broadway, New York 6, N. Y.

Soviet Purchases Property From International Nickel

Russia has agreed to purchase the Petsamo nickel property, in northern Finland, according to an announcement by Prime Minister W. L. McKenzie King of Canada on Oct. 19. This report was confirmed by the following statement of Robert C. Stanley, chairman and president of International Nickel Co. of Canada, which was made concurrently:

"Consequent upon the cession by Finland to the Soviet Union of the District of Petsamo, the ownership of the nickel mine in the territory passed to the Soviet government. In connection therewith the government of Canada has informed us that a procotol was signed at Moscow by the Canadian and United Kingdom ambassadors and a representative of the Soviet government, whereby the Soviet government has undertaken to pay $20 million (U.S. currency) in equal installments during the ensuing six years. This payment is to be made through the government of Canada for the benefit of the International Nickel Co. of Canada, Ltd., and its subsidiary in compensation for nickel properties."

Previous to the first Russo-Finnish war, the property was being developed under a 40-year concession from the Finnish government by the Mond Nickel Co., Ltd., a subsidiary of International Nickel Co. Before the conflict started in November, 1939, approximately $7,300,000 had been expended in developing the Kaulatunturi mine, smelter, and hydro-electric plant, which were scheduled for operation in the autumn of 1940. Unconfirmed reports indicate that only small damage was inflicted to the plants during the fighting which ensued.

After the plant had been seized by the Russians, it was reported that German technicians were called in to help exploit the mines. From that time until the second Russo-Finnish war, which was ushered in with the

attack of Germany on Russia in June, 1941, both nations engaged in constant wrangles for control and possession.

The nickel deposits, which average 1.6 percent nickel and 1.32 percent copper, are situated near Kaulatunturi, 50 miles south of the seaport of Petsamo on the Arctic Ocean.

Future of Magnesium Appraised by Dr. Dow

Predicting that magnesium will revolutionize modern construction, Dr. Willard Dow, president of Dow Chemical Co., told the first annual meeting of the Magnesium Association on Oct. 3, that the light metal held a greater potential power to increase wages and decrease costs "than all the laws and all the politicians on earth," and that science rather than law would aid in establishing real wages.

Stating that he anticipated immediate removal of all government controls of the magnesium industry, Dr. Dow added that such action by members of the WPB would establish them as "real, forward-looking Americans who believe in the basic principle that the government which governs best is the government which governs least."

Discussing the results of a poll which he made of the industry, Dr. Dow found that war-time fabricators are anxious to get into private business. Although a large percentage of our metal production and fabricating capacity arose out of government money and belongs to the government, it is quite remarkable, he commented, that there is practically no sentiment in the industry for the provision by the government of "feather beds" on which the industry might curl up after the war.

In appraising the future of the metal, Dr. Dow stated that magnesium was not a mere metal, but rather a "social force," and that it would multiply the effectiveness of artificially produced power by eliminating much weight in moving parts. He concluded that magnesium was no longer a "laboratory curiosity," but rather a "great new metal which gives to the public opportunities which it never had before."

Mine Machinery Produced Chiefly for Domestic Use

Mining machinery and repair parts produced during the first six months of 1944 was valued at $71,300,000, or 98.3 percent of the production rate for 1943, in which year the production was $145,100,000, the Mining Division, War Production Board, announced recently. Of the 1943 production, 87.2 percent was shipped to domestic users, and 12.8 percent, including 2.7 percent to Canada, was shipped to foreign countries. The shipment rate for the first six months of 1944, compared with the year 1943, showed an increase of 1 percent to domestic users and a corresponding decrease to foreign countries.

Zinc Production Declines; Domestic Stocks Increase

The following statistics by the American Zinc Institute reveal production, shipments to consumers, and stocks of slab zinc from 1939 to 1943, by years and monthly figures for the current year to the end of September, in tons:

	Production	Shipments	Stocks
1939	538,198	598,972	65,995
1940	706,100	762,780	17,582
1941	863,955	857,471	24,066
1942	929,770	885,568	68,268
1943	971,873	887,638	173,510
1944:			
January	84,066	63,552	194,024
February	79,893	62,716	211,201
March	86,037	84,431	212,807
April	80,405	75,213	217,999
May	80,497	80,825	217,671
June	73,067	65,785	224,953
July	72,947	63,193	234,707
August	71,281	64,158	241,693
September	66,891	64,612	243,749

W.P.B. Plans to Close Down Nevada Manganese Plant

Plans to close down the government-owned manganese leaching plant at Las Vegas, Nev., were announced by WPB early in October. The plant, operated by the Manganese Ore Co., has been producing Grade B manganese nodules. It is expected that approximately 500 employees who will be affected by the shutdown will be placed advantageously in war industries on the Pacific Coast or in nearby mines and smelters. WPB explained that the plant is a high-cost, subsidized operation, and that accumulated stocks of similar grade manganese, together with more economical output from other sources, are adequate to supply the tonnage required for production of ferromanganese necessary to the steel industry.

Colorado Mining Assoc. Plans Western Conference

The Colorado Mining Association has announced a mining and economic conference to be held in Denver, Colo., Jan. 26 and 27. Part of the meeting will be devoted to the formulation and adoption of specific programs for the welfare and development of the mining industry of the Rocky Mountain states. Mining men of the nation are invited to attend the conference and the Silver Banquet and Sowbelly Dinner which will be held in conjunction therewith.

S.E.C. and Mining Men To Confer in Montana

Governor Sam C. Ford of Montana called a conference of the Securities and Exchange Commission, Western mining men, securities underwriters, and investment commissioners of the 48 states, which met at the Finlen Hotel, Butte, Mont., Nov. 10 and 11.

The conference, which was confined entirely to small-mine financing, was held in compliance with a unanimous resolution adopted at the recent Western Governors' Mining Conference which recommended modification of "S.E.C. regulations to facilitate financing of mining enterprises." Two new mine financing forms recently released for approval by S.E.C. were subjects of discussion at the Butte meeting.

Sixty-Ton Beryl Crystal Found at S. D. Property

A 61¼-ton beryl crystal, believed to be the largest found in the United States, has been uncovered at the Ingersoll mine, which is owned and operated by the Black Hills Keystone Corp. near Keystone, S.D. The crystal, which measured from 22 to 27 ft. across one face, assayed 12 percent BeO and was valued at approximately $10,657.

Sixty-eight minerals have been identified in the mine. However, most of them are not commercial. Production of the Ingersoll mine for 1943 was as follows: lepidolite, 1580 tons; amblygonite, 101 tons; spodumene, 12 tons; feldspar, 155 tons; scrap mica, 213 tons; tantalite concentrates, 2½ tons; and beryl, 80 tons.

Small Business Committee Plans Aluminum Hearings

In outlining future activities of the Senate Small Business Committee, Senator James E. Murray, of Montana, announced on Oct. 15 that a set of hearings will be held dealing with the aluminum industry and the opportunities for new enterprises as a result of its wartime expansion.

"Thousands of fabricators are dependent for their existence on the price of aluminum raw materials," Senator Murray stated. "The wartime expansion of aluminum production has created unprecedented opportunities for the development of aluminum fabrication in new regions, and probably at lower cost. We want to explore the postwar future of the aluminum industry, not as a witch-hunt against monopoly, real or imagined, but as a study in the opportunities for expanded employment which is so necessary to the postwar solution of our national problem."

New WPB Order Removes All Magnesium Controls

All government controls on the use of magnesium for civilian products have been removed, the War Production Board announced in revoking Preference Order M-2-b on Oct. 5. At the same time Order M-2-c was issued, providing that all restrictions on the use of magnesium contained in other WPB orders no longer applied. Restrictions in other orders as to the quantity of an article that may be made or as to its size or type remain applicable, however, even if the article is made wholly or partly of magnesium.

NEW BOOKS

CANADIAN MINES HANDBOOK. Northern Miner Press, Ltd., 122 Richmond St. West, Toronto, Canada. Pp. 272. Price $1.

Revival of interest in gold mining is indicated in the 1944 edition of this familiar directory of Canadian mines. With the improvement in the war metals situation, to which the mining industry had devoted its attention in the early years of the war, many new syndicates and companies have been formed to search for gold and acquire claims all the way from northwestern Quebec to British Columbia and the Yellowknife area. Mine production of both gold and base metals has suffered from shortage of labor, but the end of the war will see unusual activity in all the mining regions of the Dominion. The 1944 edition of the Handbook reviews the position of the operating companies in detail, and gives information on active non-producing companies. The volume lists 6,663 companies and syndicates, compared with 6,300 in the 1943 edition, the difference indicating about the number of active organizations formed in the past year.

POSTWAR FEDERAL TAX PLAN FOR HIGH EMPLOYMENT. Proposed by the Research Committee of the Committee for Economic Development, New York 17, N.Y. Pp. 47.

In a far-reaching set of recommendations, issued after a year and a half of study and research by recognized tax experts and business leaders, the C.E.D. sets high employment as the goal of federal tax revision after the war. Reform of the federal tax system is essential if high-level employment is to be attained and held. Five major conclusions are presented:

1. The personal income tax should provide at least half of the total federal taxes collected, at rates that would give all taxpayers relief from the present heavy burdens. The committee feels that it would be a healthy thing for 40,000,000 taxpayers to be acutely conscious of their stake in the nation.

2. Excise and sales taxes should be lightened as much as possible.

3. Corporate taxation also should be lightened because heavy taxation of corporate earnings is very damaging to employment. It takes vital funds out of the stream of business when they are needed to create jobs.

4. Serious inequities of the present tax laws should be removed. For example, taxing corporate earnings twice —once as corporate income, and again as personal income when dividends are declared.

5. Federal taxation should be heavy enough to end the long-uninterrupted rise in the national debt, and to reduce that debt when production and employment are high.

The full report will repay careful study by the business and industrial leaders of the country.

THE CONTROL OF GERMANY AND JAPAN. By Harold G. Moulton and Louis Marlio. The Brookings Institution, Washington 6, D.C., 1944. Pp. 113. Price $2.

In discussing the intricate problem of handling Germany after the war, the conclusion is reached that it will not do to destroy German industry, apply financial controls, or mineral sanctions. Suppression of aluminum-ingot manufacture, synthetic-oil production, and aviation, also control of alloy-steel production and power-plant capacity, are recommended. Japan should be deprived of its colonies and aviation should be proscribed. However, in regard to both countries it is concluded that economic controls are not sufficient and that military policing is necessary.

The general conclusion on applying mineral raw material controls to Germany is that they would be too complicated to be administrable, too easy to evade or, if applied restrictively, would injure Europe as well as Germany.

PUBLICATIONS RECEIVED

Flotation Index. A bibliography compiled by the Great Western Division, Dow Chemical Co., San Francisco, Calif., from the year 1928.

Repair of Tools and Gages. A paper by Frederick L. Woodcock on the use of low-temperature silver brazing alloy in the salvaging of broken or worn tools and gages. Copies on application to Handy & Harman, New York 7, N. Y.

Anales del Primer Congreso Panamericano de Ingeneria de Minas y Geologia. Vol. 2, Geology. Pan American Institute of Mining Engineering and Geology, Casilla 9228, Santiago, Chile.

The following publications have been issued by the U. S. Bureau of Mines, Washington 25, D. C.:

"Suggested Hoisting-Signal Code for Metal-Mine Shafts." By D. Harrington and J. H. East, Jr. I. C. 7289.

"An Apparatus for Differential Thermal Analysis." By Louis H. Berkelhamer. R. I. 3762.

"Differential Thermal Analysis of Quartz." By Louis H. Berkelhamer. R. I. 3763.

"Applications of Thermal Analysis to Clays and Aluminous Materials." By Sidney Speil. R. I. 3764.

"Comparison of Fine-Series, Square-Mesh-Wire Test Sieves of Different Countries." By R. E. Brewer. R. I. 3766.

"Precision Jigging as a Substitute for Laboratory Sink-Float." By G. Dale Coe and Will H. Coghill. R. I. 3769.

"The Preparation and Properties of Metal Carbides." By L. J. E. Hofer. R. I. 3770.

"Geophysical Abstracts 117, April-June 1944." I. C. 7292.

"A Method for Surveying Drill Holes by Oriented Drill Rods. By L. A. Dahners and C. J. Cohen. R. I. 3773.

"Ore-Testing Studies on Gold and Gold-Silver Deposits." By J. A. Woolf and A. P. Towne. R. I. 3765, August, 1944.

"National Safety Competition of 1943." By W. W. Adams and T. D. Lawrence. R. I. 3771. August, 1944.

"Geophysical Abstracts 117, April-June 1944." By W. Ayvazoglov and V. Skitsky. I. C. 7292. August, 1944.

"Energies and Equilibria in the Decomposition of Nitrates of Manganese, Magnesium, Calcium, Barium, and Aluminum and in Reactions of Nitrogen Peroxide." R. I. 3776.

The following publications have been issued by the U. S. Geological Survey, and are obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at the prices indicated.

"Mining in the Northern Copper River Region, Alaska." By Fred H. Moffit. Bull. 943-B. Price 10c.

"Nickel-Silicate and Associated Nickel-Cobalt-Manganese Oxide Deposits near Sao Jose do Tocantins, Goiaz, Brazil." By William T. Pecora. Bull. 935-E, with maps. Price $1.

"Manganese Deposits in Costa Rica." By Ralph J. Roberts. Bull. 935-H. Price 15c.

"Geology of the Hanover-York District, Pennsylvania." By Anna Jonas Stose and George W. Stose. Prof. Paper 204, with maps. Price $1.75.

"Structural and Economic Characteristics of New England Mica Deposits." Available without charge on application to the Director, Geological Survey, Washington 25, D. C.

"Mineral Industry of Alaska in 1941 and 1942." By Philip S. Smith. Bull. 943-A. Pp. 22. Price 10c.

"Manganese Deposits in the Artillery Mountains Region, Mohave County, Ariz." By S. G. Lasky and B. N. Webber. Bull. 936-R. Maps. Price $1.25.

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REGIONAL NEWS

PART OF THE CAMP of Steep Rock Iron Mines, Ltd., near Atikokan, Ontario, Canada, showing west arm of Steep Rock Lake. Natural water line has been lowered 120 ft. Another 90 ft. of water remains to be drained. First shipment of 27 carloads, 1,400 tons, of iron ore was made early in October over a spur line of Canadian National Railways, consigned to Cleveland, Ohio.—Photograph courtesy Canadian National Railways.

ARIZONA

Fire damage at Inspiration—WLB orders new wage rates—Production increasing at East Vulture mines

★Fire destroyed a unit of the Inspiration Consolidated Copper Co. at Inspiration on Oct. 1, causing damage estimated at about $1,000,000, according to Carl Stunz, assistant general manager. The electrolytic plant was destroyed, but the flames were kept from the generator building, which housed equipment valued at more than $400,000. The electrolytic plant will be rebuilt, but it will probably take six months to get the necessary equipment and materials. In the meantime, copper production will be resumed by precipitation on iron, which method was used in 1937 to increase production. The company reported a net profit before depletion of $991,540, or 84 c. a share, for the first six months of 1944, compared with $1,074,841, or 91 c. a share, for the same period of 1943.

★Senator E. W. McFarland has been asked to sponsor a bill in Congress which would exempt new mines from taxation for the first three years of production. The request came from the executive committee of the Yavapai Council, Arizona Small Mine Operators, during a recent meeting in Prescott. According to the Council, the law would be patterned after that now in effect in Canada.

★Three Arizona copper companies—Miami Copper Co., Inspiration Consolidated Copper Co., and International Smelting & Refining Co.—have been directed by the War Labor Board to set up three lower wage classifications instead of the numerous rates now in effect, and to guard against suspicion of racial discrimination in hiring and promotion. The wage rates established by the WLB were $5.88 a shift, minimum, $6.19, and $6.36. William H. Davis, chairman of WLB, expressed the opinion that "the multitude of job titles and job rates below the $6.36 level lends itself to discrimination," and should be replaced by three labor grades and rates of pay. The companies and the Mine, Mill & Smelter Workers Union, CIO, were directed to review their existing contracts.

★Acting for the Soviet purchasing commission, S. S. Bocharnikov, a Russian government engineer, has bought a flotation mill from the Independent Pipe & Mchy. Co., Phoenix Ariz., and another plant of the same kind from the Swastika mine, near Crown King. Shipment is to be made within 30 days.

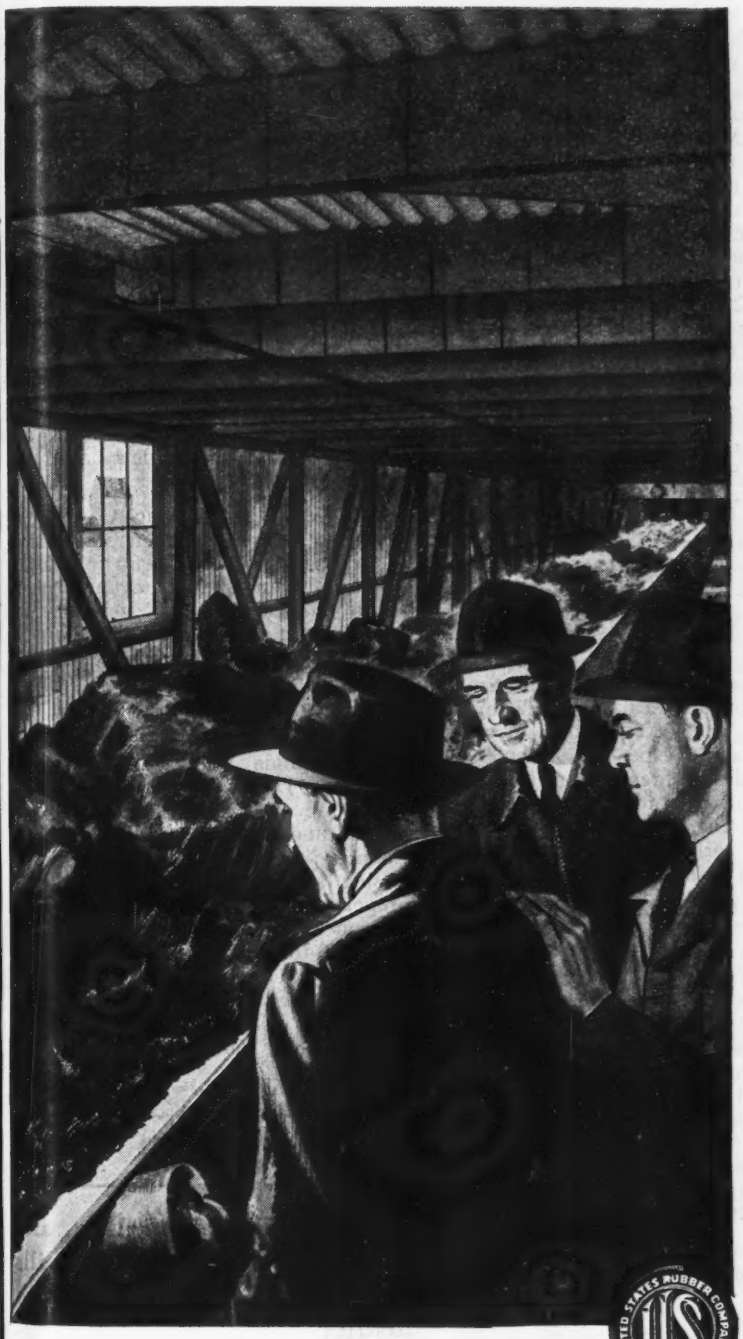
★Reconstruction work is progressing rapidly at the Mohawk shaft of the Mammoth-St. Anthony mine, Tiger, which was damaged in a recent fire.

★An increase in production from the properties of the East Vulture Mining Co., near Wickenburg, is reported by Ernest R. Dickie, president and general manager. Copper fluxing ore mined at the Belmont-McNeil mine is shipped to the A.S.&R. plant at Hayden. Lead ore from this property is concentrated in the company's mill, and the concentrates shipped to A.S.&R. at El Paso, Tex., as is also lead ore from the Moon-Anchor mine. High-silica copper ore produced from the U.S. Copper mine is shipped to the Clarksdale smelter of the Phelps Dodge Corp. Total production has been somewhat curtailed by shortage of labor. J. N. Hall is secretary-treasurer of the company; R. M. King, mine foreman; Ed. Howell, mill superintendent; and J. T. Dickie, master mechanic.

★Andy Anderson and associates, of Cleator, operators of the Eclipse mine, a scheelite property four miles south of Cleator, in the Black Canyon, have installed a compressor and other equipment. The property is developed by several open pits and an adit of 115 ft. Development has been carried on for more than a year, but has been handicapped by lack of water during the summer. It is expected that the orebody will be reached through the adit within the next 30 ft.

★Eagle-Picher Mining & Smelting Co., Sahuarita, has increased its lead-zinc mill capacity from 150 to 400 tons daily, and is now accepting custom milling ores. Present shippers include Phelps Dodge Corp.; Athletic Mining & Smelting Co., Safford; Chilson Mining Co., Twin Buttes; and W. E. Hooten, Dragoon. In addition to custom ore, the mill is handling 125 tons of ore daily from the company's St. Xavier mine, near Twin Buttes. Local manager for Eagle-Picher is E. D. Morton, Tucson. Mine superintendent is Sam Duff, Sahuarita.

★Mid-Co Reserves, of Mesa, has under way a program of exploration and development at the Pine Mountain mercury mine, in Maricopa County. H. H. Dodds, manager, formerly vice president of the U.S. Mercury Co., is in charge of operations. The mine is opened by a 300-ft. shaft, with drifts on three levels totaling 2,000 ft. The recovery plant is equipped with a Gould furnace and accessories. During the



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Arizona (*continued*)

past two years this mine, 65 miles northeast of Mesa, has produced and shipped 400 flasks of mercury. A number of high-grade lenses of ore have been found, but the large orebody is of moderate grade, although free from impurities that would complicate recovery.

★Application has been made to the RFC for an access road loan by Dr. A. J. McIntyre and George W. Brown, of Phoenix, owners of the Apache Asbestos Mines, in Gila County. The property has been operated only spasmodically for several years past, but upon completion of the road the owners propose to install a mill and other equipment. Heretofore everything has had to be packed in and out on burros through extremely rough country. The deposit consists mainly of low-grade material, but also contains pockets of No. 1 fiber.

★William Daniell and Ike Campbell, operators of the Good Luck fluorspar mine, 13 miles southeast of Wickenburg, have contracted to supply 5,000 tons of spar to the Continental Ore Co., New York City. At present only one carload per month is being shipped, but installation of larger equipment at the mine will step up production. The mineral is reported to be free from undesirable elements.

★The new milling plant of the South-Western Asbestos Corp. at Globe is in operation and is expected to run at capacity this month. The plant was completed a few months ago, having been built by RFC and DPC to serve small mine operators in the Globe district. The owners of the mill also operate the Canadian Mines, about 40 miles north of Globe. It is expected that about 40 percent of the mineral treated at the mill will be high-grade fiber.

★The Grey Goose mine, in the Crown King district, owned by J. Nezik, has resumed operations after a 90-day development program. A carload of ore was recently shipped to the Iron King smelter, at Humboldt, and a gradual increase in production is planned. The ore being mined comes from the 250-ft. level, and contains copper, lead, zinc, and a little gold.

SOUTH DAKOTA

Gold mines preparing to resume operations—Bureau of Mines is drilling spodumene deposits

★Hubert O. DeBeck, recently technical assistant to the president of Colonial Mica Corp. in New York City and formerly Western manager, with headquarters in Custer, S.D., has become associated with Mrs. Gladys Wells and Kem Koch in the new firm of Custer Non-Metallics. Mrs. Wells and Mr. Koch have long operated a well-established mica business.

Custer Mining Account Co., Harold Hedman, manager, operates the Victory mica mine, near Custer, the largest producer of condenser sheet mica in the Custer district. The mine is operated through a vertical shaft 140 ft. deep with levels at 65-ft. intervals. There is 120 ft. of drift on the first level plus a large stoped-out area above, and approximately 180 ft. of drift on the second level. The mine is well equipped with mine machinery and good buildings. There is on hand and blocked out in the mine 100 tons of condenser sheet mica. The company operates its own four rifting plants, located at Custer, Hill City, Lead, and Deadwood. It is necessary to have rifting plants in other towns than Custer on account of shortage of rifters at Custer. All mica is full trimmed and is worth $8 a pound. Nearly all mica-rifting plants now full-trim mica, as an additional profit is realized over three-quarter trim mica.

The Colonial Mica Corp., Custer, in 1943 brought $500,000 worth of sheet condenser mica, expended $150,000 for help, supplies, and rentals, and furnished mining equipment to mine operators on a rental basis. The corporation also buys beryl ore and now has on hand 100 tons of high-grade ore.

★Joseph C. Finnigan, engineer in charge of Metals Reserve ore purchasing depot, Deadwood, has announced the closing of the depot for the purchase of minerals. The depot was opened in December, 1942, and bought tin, tungsten, tantalite, columbite, beryl, manganese, chrome, antimony, mercury, and molybdenum. Future purchases of minerals will be handled by the Colonial Mica Corp., Custer. The Metals Reserve depot shipped two carloads of high grade beryl ore and has 60 tons on hand.

★South Dakota made a new record in 1943 in the production of the following minerals:

Mineral	Tons	Value
Feldspar (ground)	83,353	$607,790
Feldspar (crude)	5,198	20,605
Lepidolite	1,580	63,605
Spodumene	4,172	150,192
Amblygonite	101	4,545
Beryl	260	36,400
Bentonite (finished)	117,668	1,117,846
Bentonite (crude)	2,989	14,935
Scrap mica	1,979	41,709
Condenser sheet mica		500,000

The U. S. Bureau of Mines is core-drilling the Edison spodumene mine, near Keystone, and has completed 1,600 ft. of work, disclosing large reserves of spodumene at depth. Fremont Clark, chief engineer of the U. S. Bureau of Mines office, Custer, is in charge of the work. The Edison mine has been producing spodumene for a year and the ore is shipped to the Metalloy Corp., Minneapolis, Minn.

★The U. S. Bureau of Mines has finished trenching and sampling the large spodumene dike on the Mateen mine, near Hill City. The work has shown a large body of mineral, but it is mixed with quartz and other gangue material to such an extent that a plant would have to be built to recover the spodumene. Core-drilling of the dike is contemplated by the Bureau. Fremont Clark is in charge of the work.

★The War Production Board has recently authorized gold mines to purchase equipment and materials for rehabilitating their properties so that they may be all set to go when the "green light" is given by cancellation of WPB order L-208. Under this authority the Homestake Mining Co. has ordered and will soon receive such operating supplies and other material as will be needed when operations are resumed, thus avoiding delay after the closing order is rescinded.

★Bald Mountain Mining Co., C. E. Dawson, general manager, states that the company is all set to start operation at its mine and 300-ton cyanide plant at Trojan as soon as it gets the go-ahead signal. The company employs 200 men and is the second largest gold producer in South Dakota.

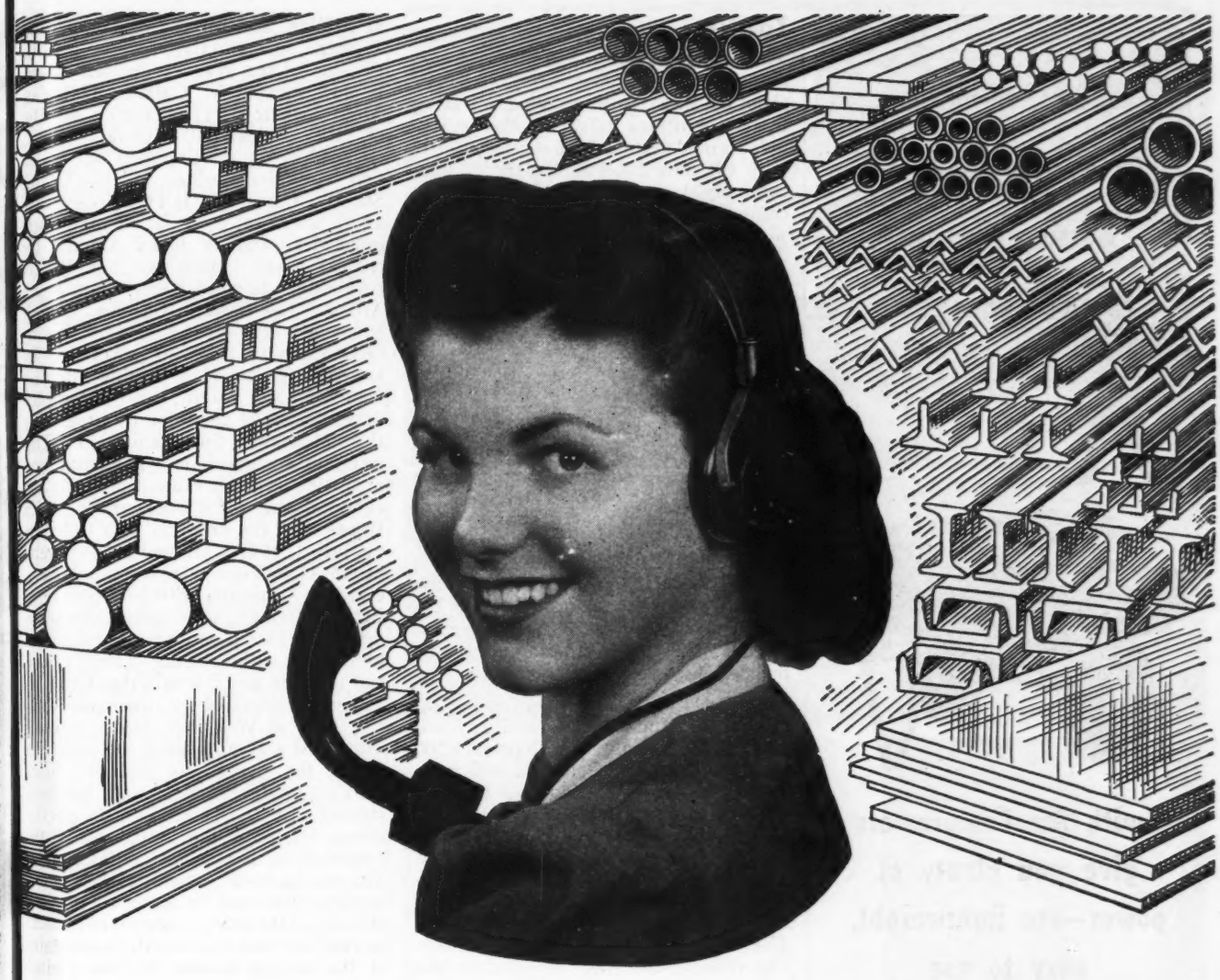
★The Canyon Corporation, Deadwood, whose mines and 100-ton daily capacity roaster-cyanide mill at Maitland, 5 miles from Deadwood, have been closed under the order issued by WPB, has bought under tax deed from Lawrence County patented mining claims comprising about 50 acres, formerly the property of the Lundberg-Dorr-Wilson Co., on which property the latter operated a 50-ton cyanide mill for ten years. C. Q. Schlereth, Denver, consulting engineer for the Canyon Corp., has had a crew of men sampling the large tailing dump on the property just purchased.

IDAHO

Lucky Friday ships lead and zinc concentrates—Federal mills dump ore—Cobalt in Blackbird district

★On Nov. 20, 1944, stockholders of the Silver Dollar Mining Co. will receive two cents per share on all outstanding "A" stock, totaling $20,000 and representing profits retained after deducting federal taxes and other items aggregating at least half of the actual net profits received from development work on Silver Dollar's portion of the Chester vein opened from the deep levels of the Sunshine mine.

"This is not a dividend," says C. O. Dunlop, president of Silver Dollar, "but is a partial refund of assessments heretofore collected by the company on Class 'A' shares." The Silver Dollar is a stock company organized to develop the eastern extension of the Sunshine vein. The company drove a long tunnel to the point where the Sunshine vein was supposed to traverse Silver Dollar ground, but no pay mineral was found. Later, mining operations were transferred to the Chester vein system, from



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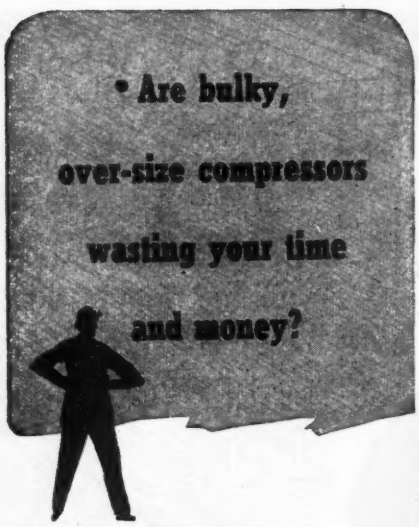

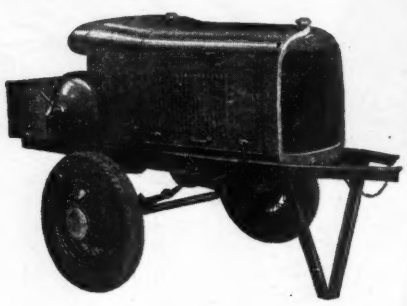

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Idaho *(continued)*

which leasers had produced some ore many years ago, but only one short shoot of pay ore was found. During these operations Silver Dollar stockholders paid many one-cent assessments.

In the meantime the Polaris Mining company, operating through Sunshine company's 2,700 level, discovered rich silver-lead ore in the Chester vein some distance farther west and 1,000 ft. deeper than the Silver Dollar workings. Polaris followed this vein easterly up to the Silver Dollar line, at which point it had developed into one of the richest and largest orebodies ever found in the Coeur d'Alene district. At this point development work was suspended for several months, until a settlement was finally agreed upon whereby Sunshine Mining, Polaris Mining, and the Silver Dollar Co. would receive one-third of the net profits derived from mining ore out of 400 ft. of the Silver Dollar's "Rotbart" claim, which it holds under a long-term lease from the Lincoln Mining Co., and for which the Lincoln company receives 12½ percent of Silver Dollar's gross net profits realized from its one-third interest.

★The Lucky Friday Silver-Lead Mining Co., of Mullan, John Sekulic, president and manager, has shipped 1,700 tons of ore to the Golconda mill from recent stoping operations on the 800 level of the company's prospect shaft. The shipment produced three carloads of lead concentrates and one of zinc concentrates. Preliminary assays on the lead shipments showed 196 oz. of silver per ton and 61.6 percent lead. The zinc shipment was not tested. The concentrates were shipped to the A.S.&R. smelter of East Helena. The company is now preparing to sink another 200 ft. to the 1,000-ft. level. Lucky Friday is a small stock company, consisting of possibly 300 stockholders, and has paid all expenses of its development from ore shipments, including the purchase price of the property.

★Federal Mining & Smelting Co. is milling approximately 750 tons of low-grade zinc-lead ore from its No. 6 Morning mine dump at Mullan. The feed is said to average about one percent lead and one percent zinc, with less than an ounce in silver. The dump is being used until such time as manpower is available for operations in the mine. In the meantime the company has repaired the old railroad grade between its No. 5 tunnel and the mill to facilitate truck handling of ore from the Haugh & Kinsella lease in the upper workings. Formerly ore from this lease was delivered to the mill through a raise chute connecting Nos. 5 and 6 tunnels, but this raise has recently caved beyond repair. The Haugh & Kinsella lease, Mike Kinsella, manager, has been operating for the past 20 years, employing as high as 80 men, and has produced a large tonnage of ore from the upper workings of the Morning and You Like mines.

★W. Earl Greenough, president and manager of the Atlas Mining Company, at Mullan, and for the past two years Western representative for the lead-tin division of the War Production Board, is now located at Gallatin Gateway, Mont., where he is managing director of the Industrial Minerals Corp., engaged in the development one of the first corundum mines in the United States. Corundum is extensively used as an abrasive, essential in many war industries, and is listed among the critical war minerals. Supply of corundum has come largely from South Africa. The Gallatin Gateway deposit is not new in point of discovery, having been located about 40 years ago by Leverett S. Ropes, a mining engineer from Helena, Mont., who attempted development of the mine by organizing the Montana Corundum Co. This company struggled along in a small way until 1903, when it ran out of funds and closed down. The lease under which Ropes held the property was to expire on July 1, 1944. He had made several attempts to interest government agencies without results until he encountered Mr. Greenough, who visited the property and found corundum crystals in abundance with evidence of large potential tonnage, and it is said that Louis W. Fuller, president of the American Abrasive Co., of Westfield, Mass., became interested and purchased the ranch on which the deposit is located. Since then active development work has been started with the building of an electric power line into the location and the construction of a modern milling plant. The management estimates the deposit as developed can be made to produce at least 3,000 tons of corundum mineral in 1945, or from one-fourth to one-third of the supply needed by the United States. The production will remain under Federal control for the duration of the war. While the initial development is under way the U. S. Bureau of Mines is diamond drilling the deposit to determine the maximum tonnage available at a given depth.

★The new federal-financed flotation mill of the Mackay Exploration Co. at Mackay is in operation, treating copper ore from the company's White Knob mine, one of the early producers in that district. Since the present company acquired the property production has been confined to individual leasing operations in the upper workings where bunches of copper ore of shipping grade were obtainable. Four carloads of this type of ore were shipped to Salt Lake smelters last month.

The company drove a long tunnel to open the mine at depth, but instead of the high-grade ore found above, it opened a large body of milling-grade ore. The Reconstruction Finance Corp. was asked for capital to build a mill, and as a preliminary to this operation the RFC had the U. S. Bureau of Mines diamond-drill the deposit, with the result that sufficient tonnage is said to have been found to warrant the loan for the milling plant.

★The Blackbird mining district, in Lemhi County, is reported by Alfred L. Anderson, of the Idaho State Bureau

of Mines and Geology, to have more prospective deposits of cobalt ore than any other known mining district in the United States. In an official report on the area, Mr. Anderson says:

"The area is extremely rugged, but transportation facilities, except for the absence of railroads, are fair. The cobalt mineralization is widespread and the known lodes are numerous. Some of the lodes carry between 1 and 3 percent cobalt over widths of 20 ft. or more, with considerably richer ore along zones a few feet wide. The gold-copper-cobalt material at the Uncle Sam mine, worked only recently, contained milling ore with about 1.7 percent cobalt from stopes averaging 9 to 10 ft. in width and several hundred feet in length. The aggregate tonnage is apparently large.

"The district has produced only copper and gold, mainly from the Uncle Sam mine, between 1939 and 1941, inclusive. This production included a little over 563 tons of concentrates, from which 179,145 lb. of copper, 297.4 oz. of silver, and 367.4 oz. of gold were extracted, valued collectively at $224,272.73.

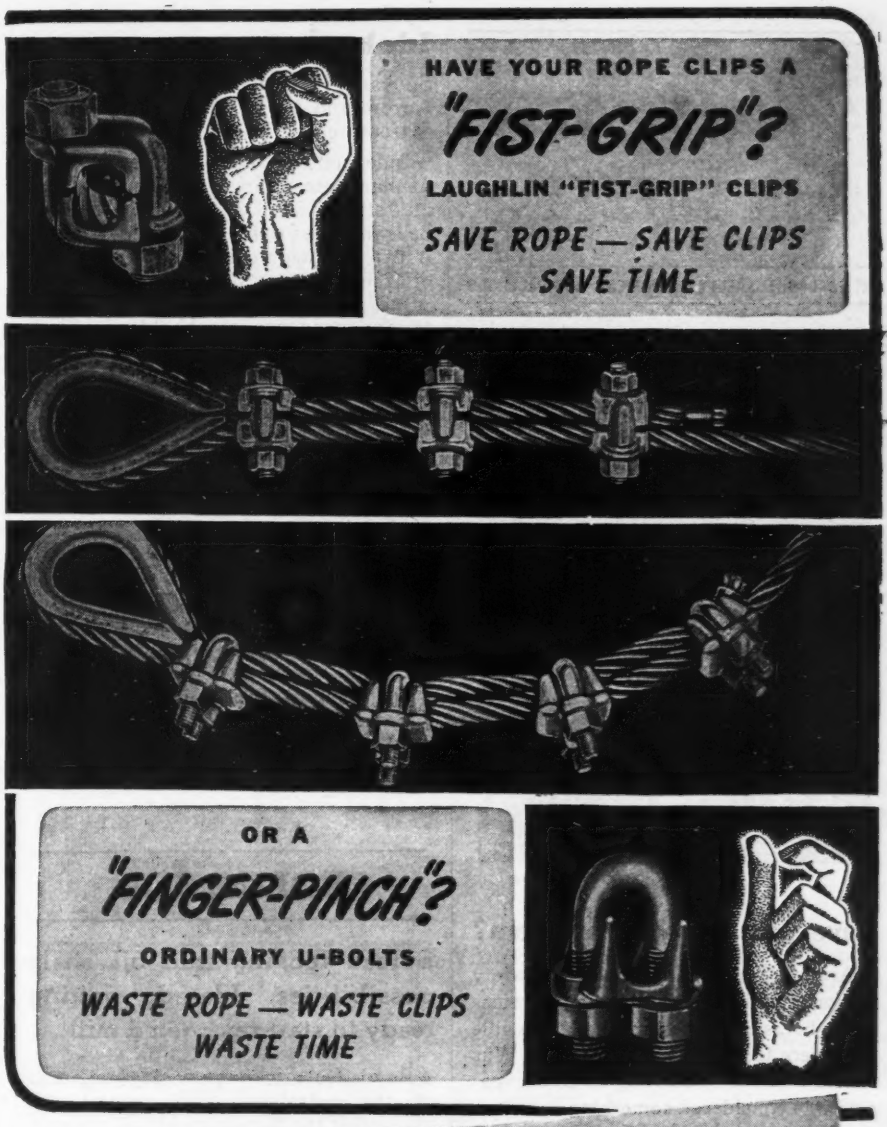
The only operating company in the Blackbird district is the Uncle Sam Mining Co., of which Floyd W. Stevenson is president and Merle Stevenson, secretary, both of Salmon, Idaho. This company is reported to be operating steadily with about 20 men employed.

★St. Joe Dredging Co. has been incorporated in Arizona by Ralph H. Pfeiffer, president, and Glen S. Francis, secretary. Head office of the company is at Prescott, Ariz. The company is reported to have several hundred acres of placer ground under lease in the St. Joe basin country in Shoshone County, Idaho.

★A new discovery of a large deposit of commercial grade mica is reported by Arthur E. Hayden, of California, who says he found the deposit 8 miles up Lionhead Creek from Priest Lake. He announces the deposit will be developed by the Colonial Mica Corp.

★The Hermes quicksilver mine, in the Yellow Pine mining district of southern Idaho, is reported to have resumed operations with 25 men under management of the Bonanza Mines Corp. The mine was recently closed because of the drop in the price of quicksilver.

★Federal Mining & Smelting Co., acting as agents for the A.S.&R. company, have started sinking the shaft on the Highlands-Aurora property, in the Beaver district north of Wallace, after making several costly improvements underground, including a better ventilating system, enlarged air-compressor capacity, and more efficient hoisting facilities. The smelting company undertook the operation of the property under an arrangement whereby it will receive 60 percent of the profits and the Highlands-Aurora company 40 percent. A.S.&R. is to sink the present shaft from the 350-ft. level to the 1,000 level, at which point the vein is to be opened. W. S. Norman, of



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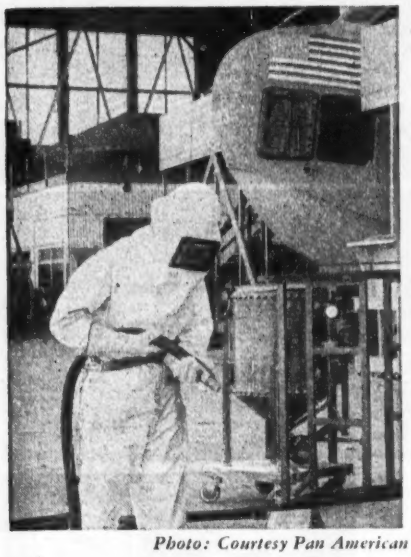

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EVERYTHING BULLARD IN SAFETY

Idaho (*continued*)

Spokane, is president of the Highlands-Aurora and M. M. Higbee, of Wallace, is treasurer.

★Independence Lead Mining Co., of Mullan, has notified stockholders that all "street" stock owned by them must be transferred to their own names before it can participate in a stock dividend of 750,000 shares of Clayton Silver Mines stock which is to be distributed to Independence stockholders. Clayton is a silver-lead property near Salmon, in which Independence Lead owned 1,000,000 shares, and is a dividend payer.

★The Coeur d'Alene Extension Mining Co. is erecting new camp buildings at its fluorspar property on Dry Creek, near Superior, Mont. The company has a prospect shaft down about 20 ft. showing a body of unknown width of high-grade fluorspar said to show averages of 78 percent acid grade.

★The Highland-Surprise Mining Co., on Pine Creek, is sinking its main Surprise shaft from the 500- to the 700-ft. level and has the work completed for 150 ft. of the distance. The company is milling at the rate of about 300 tons per day from present openings.

COLORADO

Bureau looking into oil shale possibilities. Idarado getting ready to start remodeled mill

★Boyd Guthrie, supervising engineer of the petroleum and natural gas division of the Bureau of Mines, assisted by F. D. Lankford, chemical engineer, and Tell Ertl, mining engineer, has set up an office at Rifle, and is making a preliminary survey, searching for a suitable location for an oil-shale demonstration plant. They are examining the Piceance Creek Basin between Rifle and Debeque, which was chosen for the initial survey because a large part is already government-owned. The basin includes U.S. Naval Shale Reserves No. 1 and No. 3. The shales are in the Green River formation, which contains about 80 percent of the estimated recoverable shale oil of the United States. This work will be done under the Senate Bill setting aside $5,000,000 for experimental purposes in creating synthetic fuels.

★County commissioners in Ouray County are preparing to keep all roads open to the several mines this winter. Additional trucks will be acquired to this end.

★Stoping is under way on the new 5-ft. vein of zinc-silver-gold ore recently opened up in the Country Boy mine at Breckenridge.

★Concrete bases for the new machinery at the Highland Mary mine, at Silverton, have been completed, and the ball mill is being installed. The mill, which will be a selective-flotation plant, will increase the company's production several times, and permit better recoveries.

★George W. Jump, manager of P. & J. Mining Co., has started production of zinc-lead-silver ore from the Bull Domingo mine, at Westcliffe. The mill has been completed and will be operated by Clyde Jump. The work of unwatering the mine and rehabilitation will continue.

★American Smelting & Refining Co., operating the Lucky Strike property, at Kokomo, is driving a lower tunnel to cut the orebody at depth and has diamond-drilled into the extension of the ore, which lies between the original Lucky Strike tunnel and the lower one. In the latter the company has laid heavy rails and installed a mechanical loader to speed up the work. Shipments to date are said to total $150,000. R. E. Mackey is manager.

★A crew of men with the Forest Service have started opening a road to the Alta mine, near Orpha. It will be kept open for year round operations.

★The Boston mine near Georgetown has been taken over by E. P. Moe and the workings have been cleaned out and retimbered. Present work is along a 2-ft. vein from which three shipments of zinc-lead ore have been made.

★Lawrence Martin, operating the Silver Wing, at Animas Forks, now has this silver-lead property in good condition. Several buildings, including a bunkhouse, boarding house, compressor building, and change rooms, have been built. Underground 300 ft. of the tunnel has been cleaned out and new rails have been installed.

★John Lambertson has returned to the Star mine, on Italian Peaks, near Gunnison, has shipped one car of ore, and has another ready.

★The Star mine, south of Ouray, has opened a large "mud vein" that gives promise of optical spar. These veins are mined carefully to prevent such optical spar as they contain from being broken.

★Great Divide Mining & Milling Co. has re-equipped its mine at Eureka and will start work soon. Hershel G. Burgess, who is in charge, expects to start a tunnel connecting several of the claims. H. A. Waddington, of Silverton, is president and C. W. Fleming and H. S. Sanderson are the company engineers. Work can be carried on during the winter because of improved roads.

★O. B. Wilmarth, of Georgetown, has opened some zinc-lead ore carrying copper and is shipping 100 tons a week to a mill on Chicago Creek. Forty tons of concentrates was recently shipped from his Grizzly Gulch mines west of Silver Plume. The mine, on the northwest face of Mt. Kelso, was put into production last spring. It has one of the largest zinc-lead bodies of ore in the Silver Plume district.

★C. W. Plumb, general manager of the Idarado Mining Co., at Ouray, is getting ready to start the remodeled mill

at the Treasury tunnel. Equipment necessary to put the mill in operation has been purchased. Mr. Plumb states that the Black Bear ores being mined are of equal value to those originally calculated to run through the mill, and a considerable tonnage has been stockpiled. Work on the 1,100-ft. raise from the recently completed 12,000-ft. tunnel to the downward extension of the Black Bear vein, to tap the famous old sixth level workings high on the other side of the mountain, will be started. Workmen are rehabilitating the old tunnels of the Black Bear mine preparatory to later operations from Treasury tunnel side of the range. Fred Searls, vice president of the Newmont Mining Co., and recently with the war effort of the United States and British governments, together with Oscar Johnson, president of the Idarado Mining Co., and president of the Mine and Smelter Supply Co., of Denver, spent five days at the property, recently, inspecting the complete workings, the mill, and possibilities for future operations.

★Bill Barton has installed a mucking machine and a new compressor at the Shoe Basin mine, near Montezuma, and is now stockpiling the ore.

UTAH

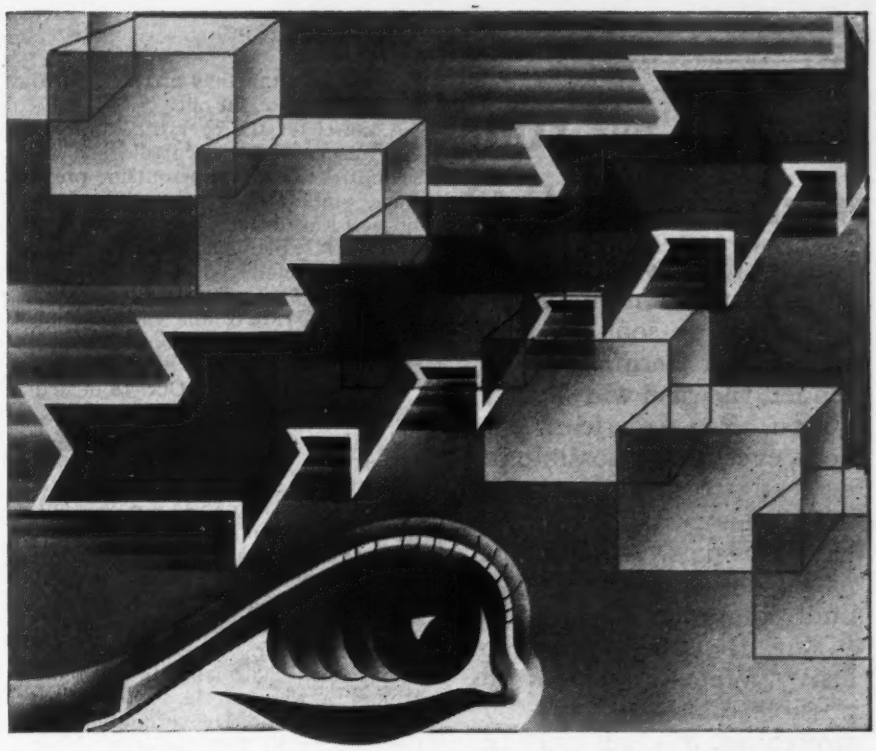
WLB denies request for general wage increase, but orders adjustments in two classifications

★In the course of a hearing conducted Oct. 16–18 in Salt Lake City, the nonferrous metals commission of the National War Labor Board denied a requested increase of 14 c. an hour sought by the International Union of Mine, Mill and Smelter Workers for some 5,000 employees of copper, lead, and zinc mining companies of Utah and Nevada.

The hearing was on disputed provisions of a proposed 1944 contract between the mine operators and employees. Wage provisions of the 1943 contract were appealed to the board many months ago, and no decision has yet been handed down on these.

Although the commission denied the 14 c. per hour increase sought by union officers, this did not preclude some increase, because the commission heard evidence for and against a proposal that Utah pay scales be raised to the level of those in effect in the Coeur d'Alene mining district of Idaho.

Pay of Utah miners is $7.45 for an eight-hour day, and that of stope miners in the Coeur d'Alene district is $8.25 a day. Ralph H. Rasmussen and Dan Edwards, representing MMSW, contended that actually most miners in the Idaho district receive $8.75 a day because of a reclassification brought about by a recent arbitrator's award. The higher pay, they said, applied to any who do timbering. Surface laborers at Coeur d'Alene receive $7.50 a



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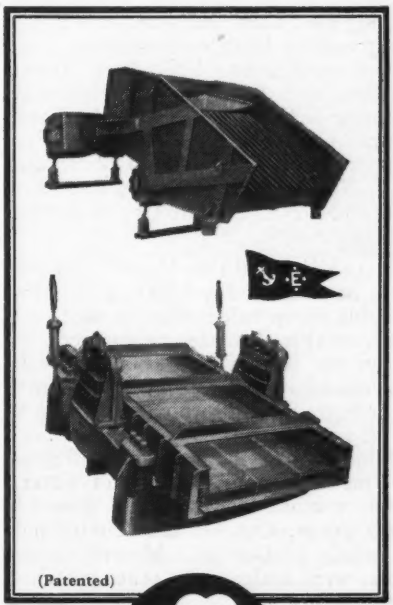

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Utah (*continued*)

day and in Utah they are paid $6.70 a day, it was brought out.

Counsel for the operators contended application of the Coeur d'Alene wage scale to Utah would be outside present wage stabilization principles. Provisions of a contract with clerical help at the Midvale plant of the United States Smelting, Refining & Mining Co. and of a voluntary agreement reached between the MMSW and the Combined Metals Reduction Co. also were considered.

The Commission on Oct. 18 denied a general wage increase for employees of the Utah Copper Co. mills at Magna and Arthur. It did, however, order the company to increase the utility labor rate from $6.35 to $6.45 a day to meet the scale common in the area, and to increase classifications now receiving $6.55 a day to $6.65 a day to retain existing wage relationships.

Decisions on other matters will be announced later. In addition to John E. Gorsuch, chairman, other members attending were Herbert Fuchs, vice chairman, both of Denver, public members; Harry F. Tilton, Giffen, Mont., and H. M. Hartmann, Salt Lake City, industry members; and James F. O'Brien (AFL), Butte, Mont., and George W. Haycock (CIO), Salt Lake City, labor members.

Companies involved were: American Smelting & Refining Co., Garfield and Murray; U. S. Smelting, Refining & Mining Co., Lark, Midvale, and Bingham; various Utah metal-mining companies at Eureka, Park City, Lark, Keetley, and Dividend; International Smelting & Refining Co., Tooele; Utah Copper Co., Bingham; Mountain City Copper Co., Rio Tinto and Mountain City, Nev.; National Tunnel & Mines Co., Tooele, and Utah Ore Sampling Co., Murray.

★Silver King Coalition Mines Co., Park City, has installed a 4,000-g.p.m. submersible pump to dewater its west end shaft, which became submerged to within six sets of the 1,800-ft. level. The trouble resulted from a blast into an orebody Sept. 28 which broke into a major watercourse.

James Ivers, vice president and general manager, said the flow of water, which reached an estimated flow of 3,000 g.p.m. Oct. 1, had diminished materially by Oct. 17. Miners, meanwhile, were assigned to other sections of the mine.

Because no pumps of the capacity desired were available immediately elsewhere, the company obtained a pump from a Salt Lake City corporation which had used it in a deep artesian well to develop additional water supply during the summer period. Silver King Coalition Mines Co. is to install a similar pump before next summer at the artesian well in City Creek canyon below the State Capitol.

★Ore on the 1,070 level of the New Park mine, Keetley, is enriched by the first appearance in the property of ruby silver (proustite), a combination of silver, arsenic, and sulphur, W. H. H. Cranmer, president and general manager, reports. The ruby silver was first encountered in the 1,070 west drift, and raises have been driven to the 900 level to open stopes between the two levels.

ARKANSAS

Change in manganese schedule is alarming — Two open-cut mines working—Little activity in zinc

★New specifications on manganese ore, which will be put into effect Jan. 1, 1945, by Metals Reserve Co., are disturbing to the operators in the Batesville field. After that date no high-grade ore in the field will be purchased by Metals Reserve that runs lower than 42 percent and which carries a phosphorus content of more than 0.3 percent. Until Jan. 1, M. R. will continue to buy ore as low as 35 percent that carries up to 1 percent phosphorus content. Some of the local operators believe that Montana is the only area mining and beneficiating manganese ore in the United States than can meet these new specifications.

★The labor situation in the field has become worse during the last 30 days. Total production for September ran to a total of 1298 tons, of which 355 tons was high grade, 350 tons medium grade, and 574 tons low grade.

★The Arkansas Manganese Co., operating the Aydelotte property, near Cushman, has installed a two-drum scraper which will open-cut the ore to a depth of approximately 50 ft.

★The Standard Mining & Milling Co. has installed a small log-washing plant on the Blake property, near Cushman. The company has not yet been able to get its large mill into successful operation.

★Stanley Bourne and Earnest Stroud, of Batesville, conducting operations on the Turner property, near Mount Pleasant, in Izard County, have a power shovel in operation and now have one pit in production. In stripping operations in September, they produced 14 tons of high-grade ore from surface dirt.

★Davis Mining Enterprises, of Batesville, are getting along well with construction work on a new washing and milling plant on the Bayou, near Cushman. When they get the plant completed they will start operations on the South Hill property, which they have leased.

★The United States Zinc Co., of Little Rock, has started operations on a 378-acre lease, covering the Casper mine, near Eaton, in Lawrence County, in the Calamine field. Charles H. Gunter, mining engineer, is in charge of operations. Good bodies of carbonate and sulphide ore have been proved on the lease. A Freeman pneumatic milling

plant will be installed to concentrate both carbonate and sulphide, whether they are mixed or not.

★Louis Frader and associates, of Eureka Springs, operating in Section 16, near Buffalo, Marion County, are making road improvements on the mountain road running from the county road to the mine, so they can move in milling and other equipment.

★Advance Mining & Engineering Corp., operating the North Star mine, near Harrison, has its air-process concentrating plant in operation. It is producing jack concentrates that run according to size, from 48 to 55 percent zinc. The plant handles from 10 to 20 tons an hour. The company's big trouble is with the fines. It has produced two carloads of this product that run from 15 to 18 percent zinc. Randal F. Prieve, of Harrison, in charge of operations, will soon replace the impactor with two sets of rolls which he thinks will reduce recent operating troubles.

CALIFORNIA

Mineral survey being made by the State to appraise opportunities for postwar employment

★California mineral production in 1943 exceeded that of any year since 1929, according to a report released recently by the State Mining Bureau, headed by Walter W. Bradley, State Mineralogist. The total value, $426,445,280, exceeds by $17,706,848 that of 1942. As regards metals, an increase in value was recorded in all except gold, silver, and the platinum group. Gold production decreased from 847,997 oz. in 1942 to 148,328 oz., which is the smallest annual output since the discovery of gold in California in 1848. Copper production was 17,172,440 lb.; lead, 11,811,034 lb.; zinc, 5,170,627 lb.; silver, 609,075 oz.; quicksilver, 33,948 flasks; and tungsten, 254,118 units. The $13,838,941 total listed as unapportioned includes production of chromite, manganese, molybdenum, barite, pyrite, and numerous other strategic minerals. While structural materials—cement, stone, clay products—showed a decrease in 1942, industrial minerals again showed a slight increase.

★According to a report from Redding, Shasta County, the U. S. Bureau of Mines will shortly establish a steel pilot plant in the workshop building at Shasta Dam. Funds have been allocated to install the plant, and shipment of equipment is to commence soon. When completed the plant will use iron and other ores found in Shasta and adjoining counties, with reduction by electric power from the Shasta Dam power generating plant. The high-grade iron ore deposits in the McCloud River area north of Redding have been under investigation by the U. S. Bureau of Mines for some time.

★Resumption of operations at its

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California (*continued*)

properties in Tuolumne County immediately WPB Order L-208 is lifted is scheduled by Providence-Tuolumne Gold Mines, Inc. Preliminary work to be undertaken soon includes installation of a power line. The company was recently authorized to issue additional shares of stock to finance planned development work. A. Vannini is president and general manager.

★Exploratory drilling operations are in progress at the property of Swansea Queen Consolidated Mining Co. near Tramway, Inyo County, following completion of a geophysical survey of the holdings by Isham and Isham, of North Sacramento. Los Angeles interests headed by E. Sanford operate the mine under a lease agreement. H. V. Burgard, general manager is in charge of operations. A. J. Brengman is superintendent.

★A. H. Ferrin and P. P. Fredericks, of San Francisco, who recently secured the well-known You Bet gravel holdings near Nevada City, Nevada County, under lease and option from Fred F. Cassidy, are completing plans for starting operations as soon as gold-mining restrictions are lifted. The operators intend to use a new excavating machine developed in association with Carl Thomalson, of Oakland. Powered by a Caterpillar diesel unit, the machine can work to roof as low as 7 ft., passing gravel back overhead to trucks or other conveyances for haulage to a washing plant.

★At a recent special session of the Legislature the California State Division of Mines was directed to make a survey of the State's mineral resources to determine to what extent they would be helpful in providing postwar employment. A report on the subject is now being prepared by Samuel H. Dolbear, mining engineer of New York and Los Angeles, together with a number of independent mining and metallurgical engineers, and the engineers of the mines division. In the past every county in the state has produced mineral products, and more than 50 minerals are mined in commercial quantities. As stated, the 1943 production exceeded in value the output of any year since 1929, in spite of the fact that gold mines have been closed. The report on the mineral industries of the state will be published early in 1945.

WASHINGTON

Victory Metals moves mill from Idaho—Mining men studying new SEC form—State resources studied

★Victory Metals Co. moved its Idaho mill into northern Stevens County, Washington, without having any mine of its own in that district, and then went out and located mineral ground which produces lead ore of sufficient grade to operate its plant continuously at a rate of not less than 50 tons per day. Ira M. Hunley, of Spokane, is president, and E. B. Gibbs, of Colville, is superintendent. The mining property is 16 miles northeast of Colville, on Bruce Creek, a tributary of Clugston Creek. The mill was set up before the mine was secured with the idea that its location on the Northport highway would give it ore that could be treated from different properties on a custom basis. The first shipment from the plant was a 40-ton carload of lead and zinc concentrates sent in October to the Bunker Hill smelter at Kellogg, Idaho. The mill is three miles from Colville, and the company may find it desirable later to move it closer to its mine. The mill has a storage capacity of 1,000 tons and a present milling capacity of 50 tons a day, which can be increased to 100 tons at a small expense, and ultimately to 300 tons. It is a modern, selective flotation mill. The company is now employing 12 men at the mine and six at the mill.

★Legal difficulties of Alder Group Mining & Smelting Co., in Okanogan County, were adjudicated by Judge Fred Witt in superior court of Spokane County. Sale of the company's property for $2,500 to Mahlon McCain, of Spokane, was approved over the protest of interested parties, who testified the holdings were worth various sums up to $1,000,000. When asked by the court if they were in a position to pay more than the amount bid, none of them made a better bid. Mr. McCain and associates were operating the property on a royalty basis from the Alder Group company until forced to discontinue operations because of the ban on gold mining. Royalties of the Alder company permitted it to pay off all its indebtedness and leave $25,000 in the treasury, which, with the $2,500 from the sale, will be distributed to the stockholders by Conner Malott, receiver.

★A. E. Torelle, of Spokane, who holds a state lease on about 400 acres in Section 16, 38N, R42E, reports that the four-mile mine-to-market road to Ione has been completed by the state and county, and that he is now ready to continue development of this zinc-lead property. The road enables him to take in equipment for exploration and for diamond drilling. All needed timber is found on the premises. Work will be continued this winter as weather permits.

★Northwest Mining Association is preparing revisions of proposed new regulations to be submitted to the SEC. Several mine operators in this region have been asked by the commission to offer suggestions, and they have turned these individual requests over to the Association, which appointed a committee consisting of Elmer E. Johnston, James L. Leonard, Leon Starmont, and Roger Oscarson to handle the matter. This committee has submitted its report.

President Charles E. Marr of the

Association said other organizations in the West were awaiting the action of Northwest Mining Association and have indicated they will support such action. It was agreed that there must be some regulation of mine development, but that regulations must be reasonable.

Northwest Mining Association will celebrate its fiftieth anniversary Dec. 1 and 2 in Spokane. Because it is the Golden Jubilee, gold mining will be featured. Delegates will register Friday forenoon. At noon there will be a joint luncheon with the Columbia Section of the A.I.M.E. Mining problems will be discussed in the afternoon, and in the evening there will be a buffet dinner. Sessions will be continued Saturday, with the mining bureau of the Spokane Chamber of Commerce joining in the luncheon, and in the evening the annual banquet will be held.

★E. E. Eddy, Spokane manager of Sullivan Machinery Co., has been elected president of Associated Engineers of Spokane, to fill the vacancy caused by the resignation of Phil J. Shenon, who has been directed to take charge of geological work for the Army in the South Pacific.

★E. P. Oscarson, district manager of U. S. Bureau of Mines, reports that R. H. Storch has completed the diamond-drill work for the Bureau at the nickel deposits near Winesap, on the Columbia. The information secured will be forwarded to Washington.

★A full report on the dolomite resources of the State has been issued by the State Department of Conservation and Development. "Virtually all the dolomite of the State is found in Stevens, Pend Oreille, Okanogan, Lincoln, and Ferry Counties," says Harold E. Culver, Supervisor of the Division of Geology. About 20,000 tons have been produced from a small quarry near Riverside, since about 1938, and have probably been used for refractories. Since the start of the war dolomite has been produced on a large scale near Northport, and is being used by the Electro-Metallurgical Corp. to make magnesium at its plant near Spokane. W. A. G. Bennett was in charge of the field work. Detailed maps and plats accompany the report.

A full report on the economic aspects on the Blewett-CleElum iron-ore zone, in the central part of the State, has also been issued by Mr. Culver's Division of Geology. It also is accompanied by plats and maps. The work was done under the supervision of W. A. Broughton.

★The Trentwood rolling mill of the Aluminum Company of America has received an order for aluminum sheet which has increased the production schedule 50 percent, J.P. Haight, works manager, reports. All this production is to be used by the military aircraft. These increases are expected to bring total employment at the plant to about 2,300.

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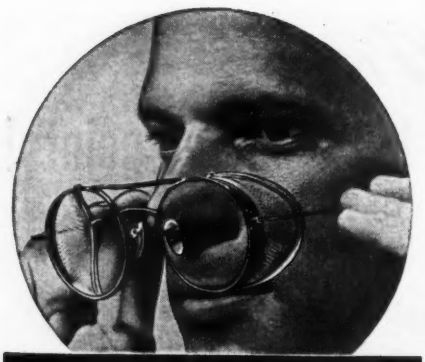

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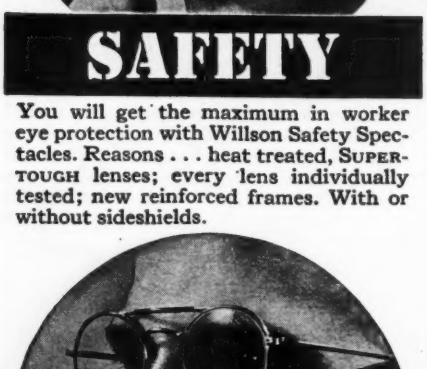

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Washington (*continued*)

pig aluminum, an all-time record for the district, were recently shipped from the Mead plant of Alcoa. In one day 24 cars were sent out. All but five of the 75 cars went to a West Coast port.

★The American Smelting & Refining Co. has been exploring the question of erecting an electrolytic zinc plant in the Tacoma, Wash., area. A decision to act on the findings of the company's investigators may be reached before the end of the year. The location is favorable for treating both domestic and foreign concentrates.

Correction

In reporting the construction of a power line from the Canadian boundary into the Metaline district of Washington, *E.&M.J.* incorrectly stated in its October issue, p. 139, that "the power to be brought in is for the Metaline Mining & Leasing Co., which operates both the Grandview and its own property for the American Zinc, Lead & Smelting Co." In order to clear up the confusion caused by this item, it is stated that American Zinc, Lead & Smelting Co. is the operator of both the Grandview mine and the Metaline Mining & Leasing Co.

OREGON

Gray Eagle ships antimony ore to Utah—Platinum property changes hands—Low-grade bauxite found

★Anthony Brandenthaler is shipping antimony ore from the Gray Eagle mine, five miles east of Baker, owned by Pat O'Brien, of Baker. Part of it goes to the Metals Reserve Co. at Seneca, and part to the American Smelting & Refining Co. at Midvale, Utah. The mine has been worked occasionally since 1907, producing in that time 245 tons of antimony metal. The property is opened on three levels by an incline shaft to a vertical depth of 115 ft. Oregon Department of Geology says the vein material occurs in a strong, well-defined zone, usually about 2 ft. wide but sometimes as much as 6 to 8 ft. A small quartz vein, 2 to 10 in. wide, runs through this zone. High-grade antimony ore occurs in lenses closely associated with this quartz. The Oregon Department of Geology and Mineral Industries in a report just issued describes in full the Gray Eagle, the Jay Bird antimony mine, in Jackson County, the Lowry stibnite claims, also in Jackson County, and several other antimony properties in the State.

★F. W. Libbey, director of the Oregon Department of Geology and Mineral Industries, reports deposit of ferruginous bauxite, 30 miles from Portland and 10 miles from the Columbia. He says the bauxite is scattered roughly over four townships, and contains 25 percent iron, usually 30 percent alumina, and about 0.15 percent phosphorus. He says it usually occurs in flat beds 6 to 15 ft. thick under silt overburden.

★R. F. Oliphant and associates have purchased the Esterly gold and platinum mine at Waldo, Josephine County. G. W. Hale, of Chicago, was the former owner. A one-mile mine-to-market road has been built to the property, which includes 2,000 acres and is said to have produced at one time half the platinum mined in the United States.

NEVADA

Magnesium and manganese plants ordered closed—Tungsten concentrate shipped from Lincoln County

★Production of magnesium metal at the huge plant of Basic Magnesium, Inc., in Clark County, will cease by Dec. 1, WPB having ordered complete closing by Dec. 31. Workmen have been released at the rate of more than 100 weekly. A maintenance crew of several hundred will be retained. Chlorine units will continue producing until at least the year's end. At the Gabbs Valley flotation and calcining plant, in Nye County, BMI ceased mining and treating magnesite in early September, and the last of the concentrate was calcined early in October. The technical staff at both plants has been largely dispersed, some going to other units of Anaconda, which has operated BMI for the Defense Plant Corp. More than 80 housing units at Gabbs, mostly of the type known as rabbit-hutches, containing four apartments, have been trucked intact a distance of 110 miles to an Army air field near Tonopah.

★Shortage of miners has continued to hamper operation of the Copper Canyon gold-copper mine and 400-ton flotation mill, in Lander County, by International Smelting & Refining Co., an Anaconda subsidiary. Since midsummer the mill has operated on one shift, according to a statement by L. E. Whicher, president of the Copper Canyon Mining Co., 25 Broad St., New York. As of July 1, 1944, International has advanced for mill, development and power and water systems $1,075,778, including $38,000 cash to Copper Canyon Mining Co. In 1943 the mill treated 99,582 tons at a cost of $4.89 per ton, producing 10,480 dry tons of concentrate containing 1,658,911 lb. copper, 76,806 oz. silver, and 6,501 oz. gold. Smelter payment was $152,234 for copper, $54,236 for silver, and $227,525 for gold, or $433,995, to which was added copper premium of $120,068, a total of $554,063. The combined gold-silver value was 65 percent. Deep drilling is in progress on the 500-ft. level, where the ore, all sulphide, contains more gold and less copper than the oxidized ore on upper horizons. J. J. Lillie, Battle Mountain, is manager for International.

★By order of the WPB, the 1,000-ton plant of the Manganese Ore Co., at the Three Kids mine, in Clark County, was closed down on Sept. 30 and some 525 workers were released. A small quantity of nodulized manganese of high quality was produced, reputedly at high cost, but mill-feed never exceeded 300 tons per day and the chemical process was pronounced a complete failure on the 20 percent ore, of which a 300,000-ton stockpile remains. Manganese Ore Co. is a wholly-owned subsidiary of M. A. Hanna Co., of Cleveland, which has operated the plant for the Defense Plant Corp. A. A. Hoffman is manager and H. L. Hazen, head of the Standard Cyaniding Co., was retained as advisory metallurgist in the endeavor to work out a successful process.

★Construction of a concentrator is in progress at the Mount Hope zinc-lead-cadmium mine, in Eureka County, a contract having been awarded Western-Knapp Engineering Co., of San Francisco. A lease on the old property, owned by a subsidiary of U. S. Steel, is controlled by the Callahan Zinc-Lead Co., of New York and Idaho. Leverett Davis, of Boise, is manager. The lessees and the U. S. Bureau of Mines are drilling in the area.

★Tungsten concentrate is being shipped from a 100-ton mill on property of the Lincoln Mines, Inc., in the Tem Piute district, western Lincoln County, where the Bureau of Mines has completed a drilling program. The scheelite contains some zinc, and tests are being made in the effort to separate the zinc. The enterprise is conducted by the Segles Contracting Co., of Denver, it was said, with Pierce C. Walker manager, C. R. Conkey superintendent, and E. H. Burdick, of Salt Lake City, engineer.

★From the Contact district, in northern Elko County, the Marshall Mining Co. was reported to be shipping four carloads of copper ore weekly to the Garfield smelter, in Utah. Maurice Marshall is manager at Contact. Lessees of two other properties in the district have made a number of shipments.

★Nevada's production of gold dropped in 1943 to around $5,000,000 from the 1941 output of $13,000,000, and silver declined from $4,000,000 to $1,000,000 in the same period, according to a summary prepared by Jay A. Carpenter, director of the state Bureau of Mines. Copper output for 1943 approximated 142,000,000 lb., lead 9,500,000 lb., and zinc 27,000,000 lb., all marking a decline from both 1941 and 1942. Total value of the four metals was roughly $28,300,000, against $39,000,000 in 1941. The total will be greatly increased with addition of magnesium, tungsten, and mercury, not yet reported.

★Development in late months of the High-Line silver-lead-gold mine on White Rock Creek, in northern Elko County, is said to have opened orebodies of high grade in tunnel workings. The mine is owned and worked by W. C.

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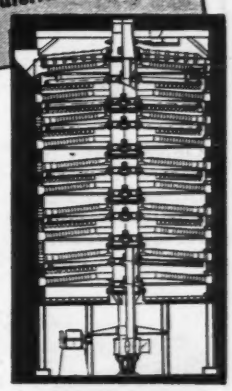

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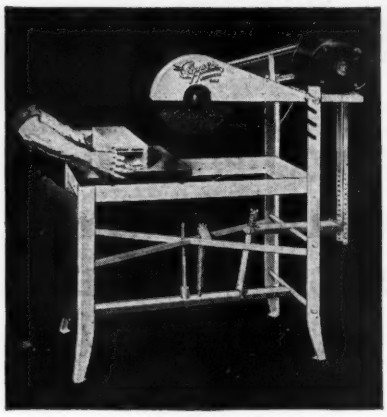

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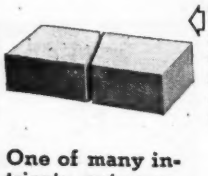

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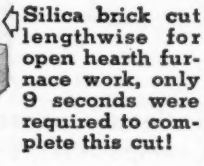

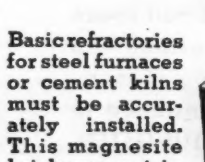

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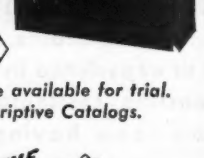

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Nevada *(continued)*

Burns and associates, of Idaho Falls, Idaho. The main vein was said to show a good stoping width of shipping-grade ore with a footwall seam of high-grade, a sorted shipment having sampled 285 oz. silver and 1 oz. gold, with a high lead content. The property nearly adjoins the formerly productive Edgemont gold mine, which is being reopened.

TRI-STATE

Operators worried over future of premiums—Production decline continued—New operations starting

★A tight labor situation, together with the uncertainty of the premium price plan and the whole reconversion program after V-E Day has had, and is having, an adverse effect on mining activities in the Tri-State mining field. Operators are trying to hold intact their present producing units, but, with the outlook as it is, are not in a position to think about expanding or looking forward to new development. What will be the effect on high-cost producers of any downward alteration in the government's present subsidy program, such as the war-expanded sheet-ground operations west of Baxter Springs and those of low-grade ore deposits in the Picher field? To what extent will these producers be able to readjust themselves to the prospects of discontinuance of the subsidy? Even with the subsidy, they have accomplished what they have in supplying war-vital zinc largely through improvements in mechanization. Without these advancements and with the most stringent labor supply in history, it would have been impossible to establish production anywhere near the levels that have been maintained. Will OPA permit some form of subsidy to aid employment in the mines after V-E Day, or will some other form of protection against the competition of a world market price for zinc be offered to domestic producers? True, there will be a demand for Tri-State concentrates for years to come, but will there be a price sufficient to bring it out and encourage new exploration? These are some of the conditions of today and the imponderables of the future with which the Tri-State operator is confronted.

The picture is well presented by production figures. Under the present circumstances, blende production rate continues to taper off and now is averaging slightly in excess of 6,000 tons weekly. This compares with an average of 7,176 tons weekly for the first three quarters of the year, a 7,238-ton average in 1943, 8,490 tons in 1942, and the peak of recent years of 9,018 tons in 1941. These figures do not show comparatively what has actually taken place in the manpower situation. Although production of mine ore has decreased sharply, the grade of ore has in many instances been increased. Several producers have been forced to this by the extreme labor shortage in an effort to hold production at the highest level possible. Movement of the 8,000-ton Eagle-Picher (MRC) Paxson stockpile, more than half of which already has been shipped out during the latter part of September and early October, will reduce district stocks to the equivalent of the output rate.

★American Zinc, Lead & Smelting Co. has completed a new shaft in the Aurora mining area, according to John Inman, of Webb City, district manager of the company. The new shaft is on the Werdein land, adjoining the Hunter land, where the company completed an up-to-date, 40-ton-an-hour concentration plant last year. The new field shaft has been put down to the 85-ft. level, Inman said. A derrick-hopper from the Smith-Hinkel operations of the company, southeast of Duenweg, is being moved and reconstructed over the new shaft. Inman also announced that the company had abandoned the Duenweg operations, the orebody having been depleted. The deposit was blocked out and developed since the outbreak of the war. Ore from the Duenweg mines was trucked to the Federal Duenweg mill for treatment.

★Eagle-Picher Mining & Smelting Co. is reopening an old shaft on the former Kansas Exploration Jarrett lease, north of Picher, in Kansas, according to S. S. Clarke, general mine superintendent. The new development is called the Sim C, after the mine superintendent. The shaft has been reopened to the 270-ft. level, where mine operations now are being carried on. Ore is being shipped to the company's Central mill, south of Cardin, for treatment.

★St. Louis Smelting & Refining Co. is reopening the old north field shaft on the Hartley lease, north of the Ballard, or No. 8, mill to provide improved ventilation underground in that area, according to Howard H. Utley, of Baxter Springs, district manager of the company. The company has been trucking ore from another field shaft on the Hartley to the Ballard mill for some time. A steel derrick and 500-ton hopper were moved from the Robob lease, west of the Ballard, to the reopened Hartley mine a few months ago.

MICHIGAN

Tamarack reclamation plant now running on amygdaloid tailings —An outstanding safety record

★Calumet & Hecla's Tamarack reclamation plant on Torch Lake is operating on amygdaloid tailings, of which there is ample tonnage for many years' operation provided the price of copper does not fall below 12c. per pound. The rich conglomerate sands were exhausted in August. The amygdaloid sand will be treated by flotation instead

of part by flotation and part by leaching. This will result in a somewhat lower cost of operation but also a lower output, and will call for the highest efficiency if production is to continue at current price levels.

The fact that sand is no longer leached does not mean that the leaching plant will not be utilized. For some time excess tank capacity has been used for treating copper-clad material and other secondary copper products. The management expects that sufficient scrap of various kinds can be obtained in the open market to permit a larger rather than smaller production of copper oxide by the leaching process. The oxide is of particular value as a wartime commodity because it is used as a base for all the non-fouling, anti-barnacle paints necessitated particularly by activity in the warm waters of the South Pacific. The entire Tamarack production of oxide is being diverted by WPB to this use.

★Operations at Calumet & Hecla's exploration at Central, in Keweenaw County, have been encouraging, leading to a decision to sink the shaft an additional 150 ft., at which elevation a crosscut will be driven to the orebody. This will permit opening 100 ft. of territory between levels for stoping.

Tests have shown that the copper content of the old "poor rock" pile is sufficient to justify milling it. Over 800 tons probably will be treated. A dam has been built near the shafthouse to provide water for fire protection.

★For outstanding safety records, several shifts of workers from Ahmeek Nos. 3 and 4 shafts, the Central mine surface and underground workers, and the Kearsarge No. 4 surface workers were honored recently by Calumet & Hecla at a banquet. They were addressed by the general manager, E. R. Lovell. Especially honored was Fred Nordstrom's shift of No. 4, Ahmeek, which has established an outstanding record in underground safety, going five years and one month without a compensable accident. This is the best record in Calumet & Hecla's long history. The workers on Mr. Nordstrom's shift presented him with a wrist watch, appropriately engraved. The records of the other shifts also were good, ranging from 422 to 791 days without a compensable accident. Mr. Lovell stated that the records clearly indicate what can be accomplished in accident prevention when there is faithful cooperation among employees in following strictly all safety rules.

IRON COUNTRY

Fifty-year leases granted on Michigan state-owned land—More mines choose CIO representation

★At the Penokee Ore Co., Ironwood, Mich., the long drift in granite on the 29th level has reached its objective, the

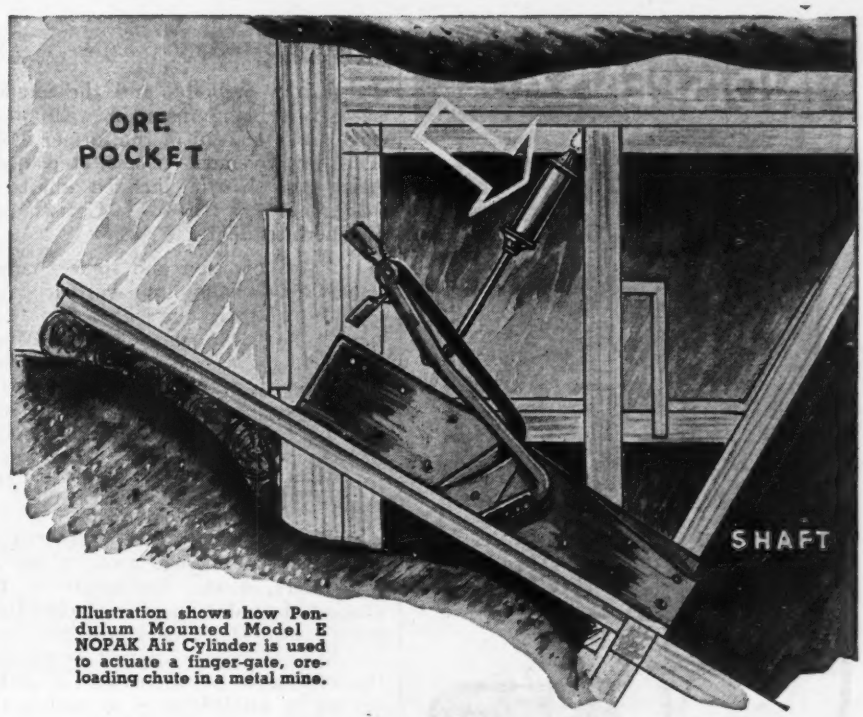
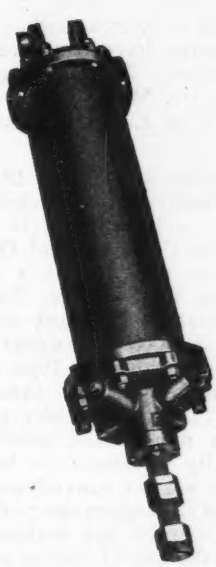


Illustration shows how Pendulum Mounted Model E NOPAK Air Cylinder is used to actuate a finger-gate, ore-loading chute in a metal mine.

Reduce Ore-Loading Costs ...with NOPAK Air Cylinders



NOPAK MODEL E Air Cylinder with Pendulum Mounting. NOPAK Cylinders, both Regular and Heavy Duty are available in 6 Standard Mountings to meet practically all application requirements.

The illustration shows how a heavy-duty NOPAK Air Cylinder may be used to operate a finger-gate loading chute which controls the flow of ore from the ore-pocket to cars or skips. It is typical of the many uses for NOPAK Air Cylinders in ore-handling and *loading* operations.

Mine operators are finding that air cylinder power provides decided advantages over manual or mechanical methods in the operation of heavy doors, bin slides and chute gates. Here are a few of them: —

- **Minimizes the hazard of uncontrollable ore-flow from bins, pockets or chutes.**
- **Keeps haulage ways clean by preventing spills.**
- **Promotes speedy loading of cars or skips, reducing cost-per-ton of ore moved.**
- **Reduces maintenance cost of loading chutes.**
- **Danger of injury to chute tenders is minimized.**
- **NOPAK Air Cylinders, controlled by NOPAK Cored-Disc Valves, are easy and economical to operate.**

Of course, there are many other uses for NOPAK Air Cylinders and Valves in mining in addition to the safe, efficient, low-cost control of loading chutes. Let us help you with the successful application of air-cylinder power to lifting, lowering, pushing, pulling or clamping operations.

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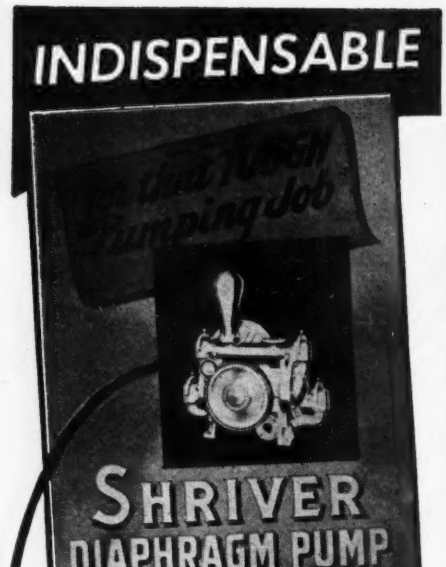

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Iron Country (*continued*)

Pabst iron orebody, and the haulage system is being installed with 30-in. gage track instead of the former 24-in. This improvement necessitated deepening the Norrie inclined shaft an additional 420 ft. A. J. Christianson is superintendent.

★Due to corrosion and some changes necessary to handle the hard iron ore from No. 7 shaft, the Oliver Iron Mining Co. has let a contract to the American Bridge Co. to overhaul and revamp the steel headframe at its Holmes mine, Ishpeming, Mich. The work will be carried on during the winter months. Capt. Fred Knight has been promoted to superintendent of this property.

★Since U.S. government research at the Cliffs Dow Chemical plant at Marquette, Mich., has improved the process of producing grain alcohol from wood sawdust, Cleveland-Cliffs Iron Co. has not only continued its production of iron ore but increased the timber cut on its 440,000 acres of land in the Upper Peninsula of Michigan. The timber removed for 1943 was close to 54 million board feet.

★Employees of the Richmond Iron Co. and Palmer Mining Co. voted at Palmer, Mich., on Oct. 9 that the United Steel Workers of America, C.I.O. affiliate, will be their sole bargaining agent. These are the last two mines on the Marquette range to be organized by the C.I.O., and charters have been granted locals at both mines. The Richmond is a subsidiary of the M. A. Hanna Co. The Palmer is a Pickands Mather property.

★Fifty-year leases on about 12,000 acres of state owned lands in Dickinson County, Mich., will be issued to the Sunday Lake Iron Co., Cleveland, Ohio, whose bids were accepted at a sale held in Lansing on Sept. 28. Lease terms require that the company spend not less than $30,000 to explore its lease holdings prior to Jan. 1, 1946, and $20,000 annually thereafter through 1949. Terms also cover royalty payments on ores mined, and establish minimum royalty payments on lands for which leases are not surrendered at the expiration of the exploration period. The company will also pay rentals on leased lands at the rate of 10c. an acre. These are the first leases of iron ore mining rights on state owned lands and meet the approval of the conservation commission to encourage mine operators to find and develop new iron ore deposits in northern Michigan.

★Evergreen Mines Co., Perry G. Harrison, general manager, intends to add a heavy-density separation unit to its plant at the Buckeye mine, in Arbo Township, on the Mesabi Range. It is expected that this will be in operation by the time shipping begins next spring.

★Cleveland-Cliffs Iron Co., which operates large interests on the Mesabi Range in Minnesota and on the Marquette Range in Michigan, is observing its centennial of iron mining. Just 100 years ago iron was discovered on the Marquette Range at Negaunee, Mich. The first mine was known as the Jackson, near the Pine Tree, which is associated with the discovery of ore. The first company was the Jackson Iron Co., because several men from Jackson, Mich., were interested in its organization. This company sold out in 1905 to the Cleveland-Cliffs Iron Co., the present owners.

★The official report of shipments of iron ore for September for the Lake Superior district, as released by the Lake Superior Iron Ore Association, shows a total of 11,329,029 tons, a decrease from a year ago of 1,413,792 tons. The total to Oct. 1, 1944, 65,903,184 tons, is an increase from the 1943 total of 800,889 tons.

★With the iron ore shipping season drawing to a close the Republic Iron & Steel Co. has concluded operations as of Sept. 30 at the Saint Paul and Stevenson mines. The M. A. Hanna Iron Mining Co. also concluded operations at the Mesabi Chief mine on Sept. 30.

ALASKA

Alaska miners debate gold problem—School of Mines reopens—Miners protest aboriginal claims to land

★W. E. Dunkle, president of Golden Zone Mining Co., urged an "open market" for gold in an address before Alaska Miners' Association, at Fairbanks, Sept. 19. He said limiting the price to $35 per ounce is handicapping the industry, for present open-market quotations are double that amount. Luther C. Hess questioned the advisability of this and said that mining industry is seeking a return to the gold standard, which would need be done on a world-wide basis and would wipe out any open market for gold. The question was left open for a subsequent meeting. Both these men and others said that tax on gross production is unfair and that it should be based on net returns. This question will be presented to the Legislature at its 1945 session. Glenn Carrington, chairman of the committee on postwar planning, reported that an effort is being made to get Congress to establish a fund to finance veterans of the first World War and the present war in mining pursuits. He said this proposal is being urged by his committee.

★The School of Mines at the University of Alaska, in Fairbanks, is being reopened, with Dean Howard G. Wilcox continuing as supervisor. It was closed in May last year, and the quarters were used for housing 200 soldiers while barracks were being constructed at Ladd Field. The Army has been reconstructing the quarters, sanding the

floors, painting woodwork, and installing blackboards and shelves. Classrooms and laboratories are being placed in the east wing of the main building, with a mine laboratory and reading room. Old equipment has been taken out of storage and a compressor, drills, and fluorescent lights have been added. Both service men and civilians will be permitted to take part-time instruction. William Fackler is resuming his position as assistant professor of geology. The mining short course of nine weeks is being given again, to conclude on Jan. 5. Extension classes will be conducted in towns of the Territory.

★Newly elected directors of Alaska Miners' Association at Fairbanks will choose their president and other officers. The directors, chosen by mail poll, are as follows: Fairbanks district Glenn Carrington, L. C. Hess, Roy B. Earling, Capt. A. E. Lathrop, R. E. Wyer. Seward Pen., W. A. Castleton, James Robbins, Frank Whaley, Fred K. Dent, Richard O. Lee. Anchorage-Willow Creek, W. E. Dunkle, Henry Waechter, L. McGee, Elwyn Swetman, Harold Strandberg. Flat-Kuskokwim, Charles Johnson, James K. Crowdy, Andrew Olson, Alex Mathieson, Gus Uotila. Southeast, E. N. Patty, J. A. Williams, Carl Whitham, Henry Roder, Norman D. Stines.

★Carl Whitham, president of Nabesna Mining Co., took to the woods in earnest this year, and spent the summer prospecting. He reports promising mineral discoveries of silver, gold, lead, zinc, and copper in the North Wrangell mountain range between the headwaters of Copper and White rivers. He says the Chisana county was pretty well deserted by men going into defense work. He found four operators. "North Pole" Nelson is working No. 8 Bonanza; Anthony McGettigan No. 12 Bonanza; Joe Davis, the No. 2 Little Eldorado, and K. J. Rickey, claims on Discovery Glacier Creek. He says floods in July and August interfered with work and that roads are badly needed, particularly one from Tok into the Chisana district.

★Norman C. Stines, representing the WPB in Alaska, is authorized to receive through B. D. Stewart of the Territorial Bureau of Mines, at Juneau, applications from miners and mining companies for equipment to be used in their operations when the war ceases. David E. Browne, supervising engineer at Fairbanks, of the RFC, has been given authority to dispose of such equipment.

★About 800 men were employed in mines in the Territory this year, and the production was substantially less than in other years. The ban on gold mining was lifted to a degree that permitted limited operations. About 70 permits for placer mining were issued, and eight or ten quartz mines did a limited amount of work. The WPB's record shows Cleary Hill Mines Co., with 20 men, was the heaviest operation in quartz mining. Arctic Exploration Co. employed 50 men in its dredging operations, and the U. S. Smelting,

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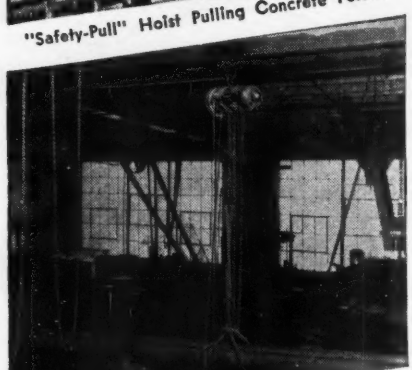

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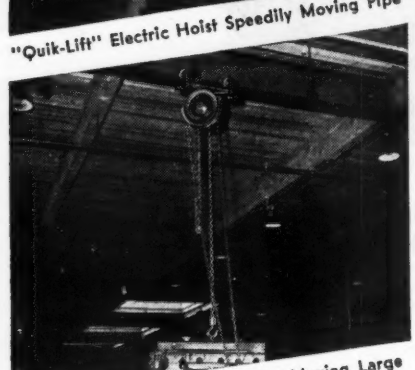

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Alaska (*continued*)

Refining & Mining Co., Livengood Placers, New York Alaska Gold Dredging Co., the Corporation of Nyac, and Wallace Porter employed smaller crews.

★The Juneau Thlinget tribe of Indians has filed petitions with the U. S. Interior Department, claiming all of the ground on which the town of Juneau is located, and the Alaska Juneau gold mine. Sitka, Douglas, and Wrangell Indians have filed similar claims. These claims, if sustained, will end mining on such grounds, according to some mining authorities. Strong protests were made at a meeting of West Coast Mineral Association and the Seattle Chamber of Commerce, in Seattle, in October against the establishment of reservations based on aboriginal claims of the natives of Alaska. It was claimed that 80 percent of the assessable area in southeastern Alaska would be included in these reservations. It was directed that a letter be sent Harold L. Ickes, Secretary of the Interior, showing that these withdrawals would seriously affect the future of mining, logging, and fishing in the Territory.

CANADA

Claim staking high in Quebec—First shipment from Steep Rock—Union wants industry-wide study

★Increasing difficulties in securing workers are reported in all Canadian mining areas. Prospects are less favorable this winter than a year ago for increasing mine payrolls as a result of seasonal employment of settlers and farm workers. One cause of the greater shortage is attributed to CIO activities in organizing miners; a second factor is the unfavorable competition of the pulp and paper companies through certain adjustments in income-tax assessment. It was reported in October that more than 2,000 men were at work in the bush in northwestern Quebec, and more are being added steadily. Labor shortage in July led to closing down one of Noranda's reverberatory furnaces, with the expectation of adding sufficient workers in November to restoring operations to the former rate. Noranda has lost 110 workers since Aug. 1, a total of 260 having left the mine since last May, and the payroll at the Lamaque mine has been cut from 700 to 270, resulting in tonnage cuts from 1,200 to 450 a day. International Nickel is reported to be short 2,000 men.

★Canadian gold mines have not yet been given assurance of a modified selective service policy in supplying additional mine labor. New workers are being allowed for some gold producers under a quota system that was announced several months ago, such mines being given a higher labor priority until the quotas were filled, when they dropped back to a nonessential priority. Selective Service officials announced Sept. 23 that no general relaxing of regulations for gold mining could be applied at this time.

★Widespread opposition has been expressed in Canada to a statement made in September in Toronto by C. H. Millard, national director of the United Steelworkers of America. "A subtle and sinister" effort, he said, is being made to introduce the theory of preferential treatment for war veterans in major Canadian war industries. Former mine employees who are serving in the armed forces, many of them having been on duty since September 1939, hold the belief that preferential treatment will be due them when the time comes for a return to civilian life. Many of these men continue on the payrolls of mining companies and are recognized as on leave of absence. These employees are being deprived of their rights by CIO policy as it is now being expressed.

QUEBEC

★Three diamond drills are being operated underground at Sullivan Consolidated Mines, two more are on the adjoining Legault property, and one is testing the Carriere Bay claims, along the north contact of the Bourlamaque batholith. Both of these properties are under option to Sullivan, which is holding additional ground aggregating several thousand acres for exploration as soon as drill equipment is available. In spite of the serious labor shortage last summer, ore reserves have been maintained. The main shear zone has been explored down to the 17 level in the Sullivan mine and development of the No. 9 vein is being started. A controlling interest is held in East Sullivan Mines, south and east of Lamaque, where a diamond-drilling program is in progress. Pierre Beauchemin is vice president of Sullivan and president of East Sullivan. Douglas Parent is mine manager at the Sullivan mine.

★Early action is expected in authorizing construction of a three-mile road westward from Malartic, Quebec, on the Abitibi Highway, to the properties of Amphi Gold Mines and Parbec Gold Mines. Consideration is being given to extending this projected new route all the way to Cadillac township, near the Lapa Cadillac mine, which would reduce the distance between Rouyn and Val D'Or by about seven miles. Amphi is controlled by Howey Gold Mines and adjoins Sladen Malartic on the west. Both Amphi and Parbec have announced plans for shaft sinking as soon as present development restrictions by Ottawa have been removed.

★Claim staking at a rate four times the scale a year ago is reported for the Northwestern Quebec mining areas by the Deputy Minister of Mines, A. O. Dufresne. Activity has spread through the broad district from Ontario east beyond Senneterre. Interest has been largely centered along the two main gold belts, one extending east from

Porcupine through the Duparquet-Destor area, and the other covering the belt eastward from Arntfield and Noranda.

★East Amphi Gold Mines, holding a large group of claims in Malartic Township formerly controlled by Amphi Gold Properties, reports promising results from drill hole No. 70, located about 1,000 ft. west of the previous tests. A 900-ft. ore length has been indicated by the present drilling program, in schist intersected by diorite dikes. The new hole intersects acid intrusives and has indicated a 30.5-ft. section that assays $6, and a second section 8.4 ft. in width contains $12.87 in gold per ton. Col. T. W. MacDowell is vice president of the company.

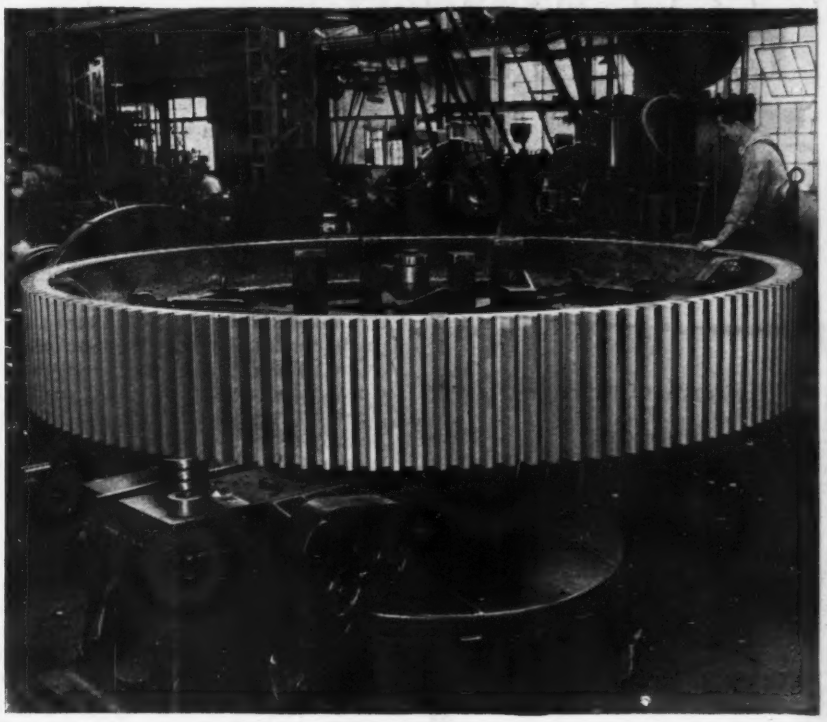
★Closest control of grade of any Canadian gold mine is shown by Sigma Mines, Quebec subsidiary of Dome Mines. In the first nine months of this year, production shows an average recovery of $7.33 a ton, compared with $7.35 in the same period last year and $7.56 in 1942. The volume of ore mined in these same periods, at 229,480 tons this year, compares with 302,232 tons in 1942.

ONTARIO

★The first trainload of twenty 50-ton cars of iron ore from the property of Steep Rock Iron Mines arrived Oct. 4 at Superior, Wis. The following day a trainload of 45 cars was delivered. During the remainder of the season it is planned to make daily deliveries of about 50 cars of ore for shipment in vessels of Cleveland-Cliffs Iron Co. to a Lake Erie port. The average price to be paid for ore of this premium grade has been estimated at $6.10 a ton, in Canadian funds.

★An unofficial report has been published on activities this season in Labrador, under the direction of Dr. Joseph A. Retty. The Labrador Mining & Exploration Co. maintained five prospecting parties and five geological crews in the large area of the concession, which extends westward into the Province of Quebec. Five drill crews worked on the extensive iron deposits and tested promising occurrences of nickel and copper ore. Unfavorable weather shortened the season for active field work to two months, as compared with the period June 15 to Sept. 15 normally followed since 1936. Proposed railway construction after the war is expected to lead to extensive development of iron and other mineral resources.

★On Oct. 6 a decision by the Ontario Labor Relations Board denied applications made by twelve mining companies in the Porcupine camp for the right to appeal the previous decision denying employees who were absent on military service the authority to vote on labor representation. Previously a similar decision had been arrived at by the National Wartime Labor Relations Board at Ottawa, concerning an appeal of Noranda Mines. Early in September, mine employees in the Porcupine area voted for the Timmins Mine and



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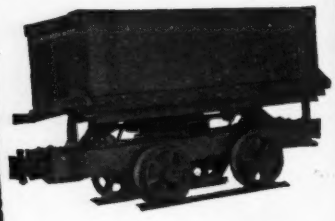

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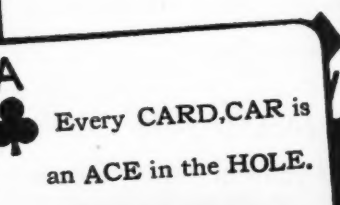

C.S. Card Iron Works Co.
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Canada (*continued*)

Mill Workers Union, Local 241, as their representative.

★The Royal Ontario Mining Commission in October issued a final report which brings to a total of eight volumes the results of a year of concerted effort by the eight Commissioners, of which Norman C. Urquhart acted as chairman. Among recommended changes are the following: (1) Repeal the present Securities Act and adopt new legislation in simpler form to control the sale of mining securities. (2) Appoint a three-man commission qualified to regulate mine financing. (3) Registration of all companies, except $10,000 prospecting syndicates, and individuals who offer securities to the public. (4) Full disclosure of all interests in connection with the sale of mining stocks. (5) Prospecting and development to be at least five years ahead of production, to stabilize output. (6) Appointment of a full-time, properly qualified Minister of Mines for Ontario. (7) Employment of Royal Canadian Air Force personnel in postwar years in mining areas, with suitable planes and equipment. (8) Mine development to be given high priorities for men and materials as an aid in employing those returning from the armed forces. (9) Government-owned concentrators to be established in suitable areas.

MANITOBA

★San Antonio Gold Mines has taken a prominent place among Canadian mines in sustaining ore reserves in spite of labor shortages. Production is reported to have dropped not more than 30 percent below mill capacity, due largely to the use of diamond drills in breaking ore. Reserves are believed to be close to the 916,000 tons reported at the end of 1943. Drilling at a horizon 300 ft. below the deepest level at 2,400 ft. has picked up promising ore extensions. In addition to active development planned at such time as miners are available, exploratory work is projected for the adjoining ground of Forty Four Gold Mines, where considerable promise has been found of commercial values.

NORTHWEST TERRITORIES

★Recent results from the two diamond drills engaged in exploring the Giant Yellowknife property, controlled by Frobisher Exploration and associates, serve to confirm earlier reports of a major orebody. Reports received in Toronto on Sept. 28 and Oct. 10 describe the Dadson shear zone as being proved for a length of 1,600 ft. and still open to the north. Logs have not yet been reported for holes Nos. 157 and 158, although good results were secured from panning sections from a 40-ft. core length from the former hole and low values were indicated for the last hole. Results previously reported from the north end of this zone, representing 35-ft. widths, showed $15.75 for hole No. 146 and $7.70 for No. 150. One of the drills is now being used to test this zone at vertical depths of 325 ft. below these two latter holes. Assays reported for No. 152 show $8.40 in gold across 80 ft. and $5.95 across 120 ft. Hole No. 154 gave core that assayed $3.85 across a width of 84.7 ft. After securing a series of deeper intersections it is planned to use both drills in exploring the main shear zone farther to the north, where a length of about 1,800 ft. shows promising possibilities. Winter camps are under construction so that drill exploration can be continued through the winter.

★Drill exploration is in progress on the property of the Con Mine of Consolidated Mining & Smelting in an effort to locate an extension of the Giant Yellowknife ore zone, which is separated from the Con by Kamlac claims, also undergoing diamond drilling. Prospecting and exploration in the Yellowknife field is being carried on by the Con staff, which includes five geologists, six prospectors, and two drill crews. Since closing down the Con mine last year a crew of 40 men has been advancing development, which is now centered on the 1,400-ft. level. Production at the Con started in 1938 with a 90-ton mill, enlarged in 1942 to a 350-ton capacity. On the Rycon property, adjoining on the east and also held by Consolidated, ore has been developed to a depth of 950 ft. and it is planned to continue the present development program through the winter to prepare this, along with the Con mine, to resume production as soon as conditions will allow.

BRITISH COLUMBIA

★The International Union of Mine, Mill and Smelter Workers will carry its request for a commission to investigate the nonferrous mining industry to the Dominion government. The following six officials have been named as delegates to confer with government leaders: F. W. Henne, of Trail; G. W. Anderson, of Copper Mountain, and James McFarlane, of Kimberley; Chase Powers, International board member representing British Columbia, California, and Idaho; Thomas Murray, of Butte, Mont., representing Alberta, Saskatchewan, and Montana; and Robert Carlin, M. L. A., of Sudbury, Ont., representing Ontario, Quebec, and Manitoba. A petition recently presented to the cabinet of the British Columbia government gave notice of the intended application to Ottawa for the appointment of a Royal Commission "to investigate the whole (mining) industry and to develop a program for the postwar years which will remove the uncertainties that exist today and on that basis to remove the grievances of the men and women engaged in the industry." The delegation also proposes to meet the National War Labor Board to discuss wage structures and employment conditions. The International union has commenced negotiations with the T. Connors Diamond Drilling Co., Ltd., for a contract covering runners, helpers, setters, and others engaged in diamond drilling. Proposals for a labor contract have been made to

Base Metals Mining Corp., Ltd., to cover employees at the Monarch and Kicking Horse mines. Joint application by the union and the management of Britannia Mining & Smelting Co., Ltd., has been made to the National War Labor Board for a more generous allotment of annual holidays for employees.

★Discoveries of tin and beryllium have been made during the past season in the Duncan River area of the Lardeau mining division by prospectors financed under the Wartime Prospectors Grubstake Act of the Provincial government.

★Cuyuni Goldfields, Ltd., British Guiana gold producer with head office in Vancouver, elected W. J. Asselstine, M. L. A., Victoria, and Henry J. Reifel and H. J. Paisley, Vancouver, to the board of directors at the annual meeting of shareholders last month. Matthew Sutton, Vancouver; William Dann, Ladner; J. G. Robson, New Westminister; and Major A. J. Williams, British Guiana, were re-elected. Hal M. Powell, formerly in charge of Ptarmigan Mines, Ltd., at Yellowknife, N. W. T., is mine manager.

★Silbak Premier Mines, Ltd., Portland Canal district, received net smelter returns of $49,314 for August production, recovered from the treatment of 5,256 tons of ore, averaging 0.25 oz. gold and 2.15 oz. silver per ton. Estimated operating loss write-offs was $4,360.

★During the third quarter of 1944, Bralorne Mines, Ltd., Lillooet mining division, produced 18,280 oz. gold, valued at $703,780, from 27,588 tons, averaging 0.66 oz. gold per ton. The aggregate production for the first nine months of the year is 53,607 oz. gold, valued at $2,063,870, from 80,450 tons, averaging 0.67 oz. gold per ton. According to official advices received by shareholders, development work at the Bralorne mine has been excellent. The higher grade of ore milled has enabled the company to continue its prewar scale of dividend disbursements.

★The contract with the U. S. Commercial Company for the purchase of quicksilver from the Takla mercury property was cancelled as of Sept. 9. As the open-market price was below the cost of production, the mine was shut down. It had a productive life of less than a year, having placed its mill in operation on Nov. 27, 1943. Its closing should enhance Bralorne's financial position, inasmuch as its operation resulted in a loss, and the transfer of much-needed labor will improve conditions at the big Bridge River mine.

★Pioneer Gold Mines of B. C., Ltd., Lillooet district, is preparing to develop a new vein on the Eagle and Eagle Fraction mineral claims, which were acquired last year for $75,000 cash. It is proposed to extend a crosscut, already driven for 400 ft., a further distance of approximately 750 ft., to intersect the vein, which is not thought to be related to the Countless

A Pictograph
OF EFFICIENT DUST DISTRIBUTION

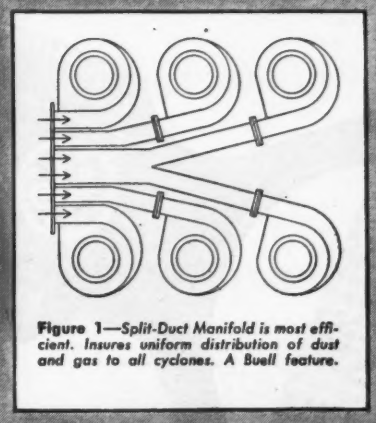


Figure 1—*Split-Duct Manifold is most efficient. Insures uniform distribution of dust and gas to all cyclones. A Buell feature.*

THE MOST EFFICIENT METHOD
(Buell's)

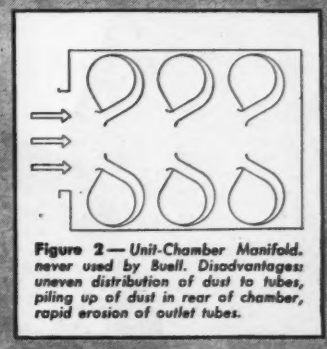
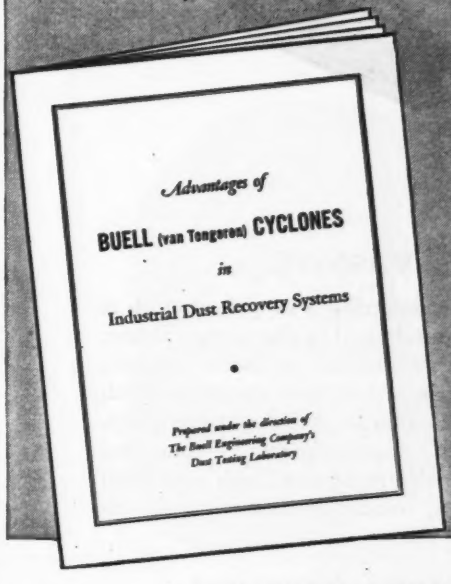


Figure 2—*Unit-Chamber Manifold. never used by Buell. Disadvantages: uneven distribution of dust to tubes, piling up of dust in rear of chamber, rapid erosion of outlet tubes.*

THE LEAST EFFICIENT METHOD
(Never used by Buell)



BOTTOM VIEW OF
MANIFOLD ASSEMBLY

Every engineer and operating executive should have a copy of the bulletin shown above as his guide in the selection of the right dust collection equipment.

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MINIMIZES EROSION

The scientific development of inlet manifolding for multiple unit cyclone dust collectors has played an all important part in the uniform distribution of both gas and dust in cyclone collectors. How proper manifolding is achieved in Buell Dust Recovery Systems is shown in the pictograph on this page. What happens when the dust load is not uniformly distributed, and how serious these disadvantages may be, is best described in the bulletin shown on this page, from which these two manifold sketches were taken.

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What to Look for When Selecting Varnished Cloth

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GENERAL ELECTRIC

Canada *(continued)*

vein, from which virtually all Pioneer ore has originated, or the new "27" vein, which shows much promise at depth in the Pioneer mine. Milling has been resumed following a temporary suspension due to repairs being effected to the shaft headframe.

★Optionees of the upper Bridge River property, owned by Bridge River Consolidated Mines, Ltd., have let a contract to Boyles Bros. Drilling Co., Ltd., for diamond drilling. The holes are to be driven from the Hurley River canyon, about 800 ft. below the previous lowermost development. The work is being directed by Cecil Rutherford, consulting engineer of Jason Mines, Ltd., with whom the optionees are closely identified.

★The superintendent of brokers for the Province of British Columbia has approved the release of all escrow shares of Congress Gold Mines, Ltd., and Taylor Windfall Gold Mines, Ltd.

★Quebec Gold Mining Corporation, Ltd., subsidiary of Hollinger and Noranda, has acquired an option on the Hido gold mine, near Taseko lake in the Clinton mining division.

★The Cariboo Gold Quartz Mining Co., Ltd., produced 8,133 oz. gold, valued at $313,117, from 19,522 tons of ore treated during the first seven months (ending Aug. 31) of the current fiscal year. Only 93 ft of exploration and development work and no diamond drilling were done. Ore reserves, as of July 31, 1944, were estimated at 378,068 tons, averaging 0.39 oz. gold per ton. Working capital at the end of the half-year was $434,542, compared with $429,233 at the beginning of the fiscal year. R. R. Rose, managing director, advised shareholders: "During the second quarter there was practically no change in the manpower situation, the number of employees on the payroll at the time of writing (Sept. 25) being 155. About the middle of August the company was placed in a higher category as regards manpower, but no benefit therefrom has yet taken place."

★September production of Island Mountain Mines Co., Ltd., Newmont's Cariboo district subsidiary, was 750 oz. gold, valued at $28,890, from 1,668 tons, averaging 0.45 oz. gold per ton.

★The Granby Consolidated Mining, Smelting & Power Co., Ltd., has informally secured a 60-day renewal, to Dec. 31, of its contract with U. S. Commercial Co., Washington, D.C., for the sale of copper concentrate.

★Hedley Mascot Gold Mines, Ltd., Osoyoos mining division, although undermanned by close to 50 percent, is breaking more ore than at any time in its history. As a result reserves are being materially increased and broken-ore reserves are now in excess of 60,000 tons. Current earnings are more than sufficient to cover the cost of all development work, including the driving of the long low-level tunnel, now advanced almost 400 ft. on a horizon 600 ft.

below the present lowermost development. Ore obtained from open-cut mining of the Wheeler (Good Hope) property, 2½ miles east of the Mascot Fraction, is being stockpiled pending completion of a road to connect with the Mascot mill.

YUKON TERRITORY

★The Yukon Consolidated Gold Corp., Ltd., largest gold-dredging operation in Canada, reports the value of August production at approximately $85,000. June production was valued at $152,000, and July, $123,000.

MEXICO

September floods hamper mining in many states—Prospecting of national reserves has results

★Fall found mining in Mexico proceeding moderately well. A large sector of the industry, particularly in Chihuahua and Coahuila, and especially in the Parral district of the former state, was hard hit by floods in September that cost many lives and did great damage in 13 states. The industry is much concerned about the decrease in demand for many of its products in the United States and the lowering prices offered. Mine workers of the northern states have petitioned President Camacho to provide some aid for them and their employers in a situation they said is becoming more difficult. Impairment of rail transportation by the floods put this service further below par for mining. The National Railways have made great efforts to restore their schedules to as near normal as possible by repairing rights of way and building temporary bridges to replace those washed out. Nevertheless, ore movements were blocked more than ever by lack of box cars and gondolas.

★Good results in the exploration of Mexico's mining reserves which was started last February are reported by the Directive Committee for Investigation of the Mining Reserves of Mexico, that was created by a presidential decree. The field workers, who are Mexican geologists, have explored important antimony deposits in San Luis Potosi, Guerrero, and Oaxaca; fluorite in Guerrero; tungsten in southern Sonora; mercury in Guerrero, Durango, and Zacatecas; manganese in Baja California and Chihuahua; mica in Oaxaca; copper and molybdenum in Guerrero.

★Employees of Cia. Min. Estado del Norte, S.A., which works the Cerro del Mercado, the great iron mountain near Durango City, staged a sit-down strike because, they alleged, the company owed them two weeks' wages.

★Cia. Min. La Union, S.A., Los Lamentos, Chihuahua, lost the first bout of its seven-year litigation started in 1937 by its employees when the federal board of conciliation and arbitration ruled that it must pay them nearly 1,000,000 pesos

(VOTE FOR SIX)

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☒ NAYLOR for high and low pressure air lines

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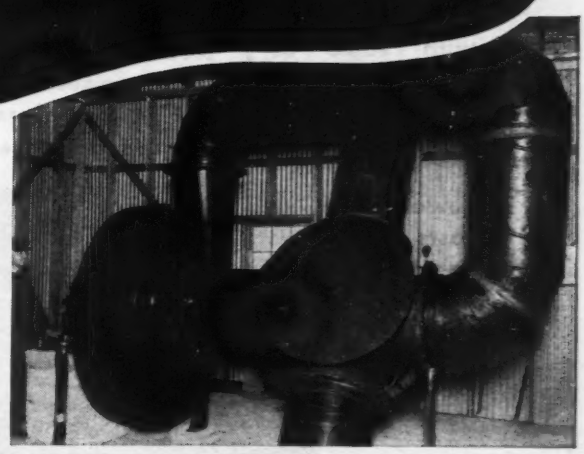

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The most plastic, wet, clayey materials will not slow production. Has saved the cost of 10 men for one company.

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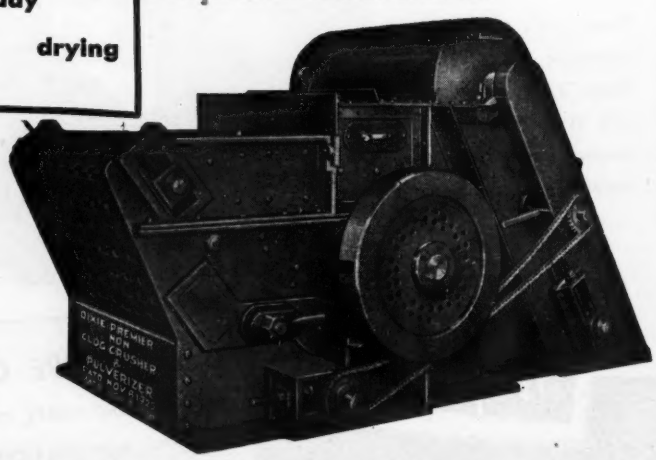

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Mexico (*continued*)

($210,000) to cover claims for wages, paid annual vacations, and various indemnifications, including one for unjustified dismissal. The men began litigation when the company suspended operations in 1937 without, the employees said, paying them wages owing or vacation money and indemnifications. The company is expected to appeal.

★Production of steel in electric furnaces is soon to be undertaken for the first time in Mexico by Fundiciones de Hierro y Acero, S.A., newly organized, that absorbed Hierro Fundido de Mexico, S.A., at a plant at San Pedro de Los Pinos, Mexico City suburb. Raw material will be ingots obtained from Mexican foundries and scrap iron. The plant is to make molded pieces up to 15 tons' weight, for railroads, mining machinery, and heavy machinery in general

★Kildun and the Cia. Min. de Santa Maria de la Paz y Anesas, both operating in San Luis Potosi, have again had their old trouble, forced to shut down because of the lack of gasoline and other oil combustibles. Both asked the Labor Ministry to excuse them from paying wages during the closure, which they asserted was not their fault, as the National Railways and Petroleos Mexicanos, the official oil company, has failed to make adequate deliveries.

★An unusual labor case was handled by the national supreme court when it upset approval by the Federal Board of Conciliation and Arbitration for the Fresnillo Company, Fresnillo, Zacatecas, to dismiss several employees because they were drunk when they reported for work. The court interpreted the law as giving miners three chances when they report for duty while under the influence of liquor. The men in this case, evidence showed, had reported for work only once when they were drunk. They had appealed the Board's ruling to the supreme court.

★The Rayon district, Uruachic, Chihuahua, where there has long been mining but on a small-scale, is reported to be the scene of discovery of promising gold and silver deposits. Cia. Min. de Uruachic, S.A., is sinking a shaft, designed to bring the San Timoteo y Anexas group of mines into early operation.

★Production in the mining industry this year up to August was about 60,000 metric tons higher than during the corresponding period of 1943, but its value was more than 100,000 pesos ($20,650) under that of the 1943 period. The output in 1943 was 1,725,103 tons, worth 825,532,918 pesos, the highest in many years. The greatest increases reported thus far in 1944 have been in iron, coal, and manganese. Production of precious metals, copper, lead, zinc, antimony, arsenic, graphite, and molybdenum decreased. The drop is attributed largely to lessening demand for these products in the United States. The expectation in mining circles is

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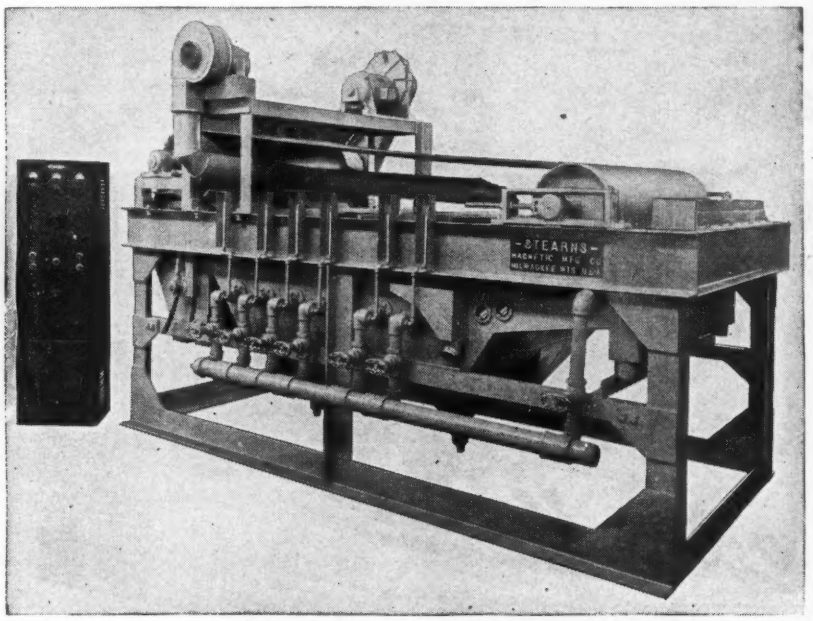

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Mexico (*continued*)

that this demand and the prices for these products will continue to decrease north of the Rio Grande.

AFRICA

Two important gold operations to close for lack of ore—Arbitration board to settle wage dispute

★Much interest has been aroused by the discovery, in the Karabib district of South West Africa, of pollucite, which is the only caesium silicate mineral known. Caesium, besides being a rare mineral, is mined in only a few localities. The chief source of supply is Sweden; smaller deposits exist in North America and on the island of Elba. At the moment the extent of the new deposit is unknown and it is impossible to assess its value as a commercial proposition. The chief application of caesium is in the manufacture of radio valves, where its affinity for oxygen creates a high degree of vacuum. The compounds are also used as chemical reagents.

★The reports of the commissions appointed to inquire into the proposed cessation of mining operations by Van Ryn Deep and Witwatersrand Deep have been forwarded to the Minister of Mines, and the following statement has been authorized by him for publication: "The reports show clearly that the grade of ore reserves has fallen, that the area held under mining title has been very thoroughly explored, and that there is little hope of finding any new payable sources of ore. Rising costs, coupled with the shortage of native labor, have changed the small margin of profit into a loss, and the two companies have now reached the stage where they can no longer carry on mining operations on a profitable scale. It is possible that neighboring companies whose workings give access to these mines may be able to extract some payable ore from them after they close down and that a certain amount of tributing may be possible. It is probable that over a period the employees of the two mines will be absorbed by other mines. On the facts presented in the commission's reports, it appears that the grant of government assistance is not warranted, the average grade of ore being low and the tonnages left over being limited."

Written notices terminating the services of all salaried officials and employees on Sept. 14 were issued in the case of Witwatersrand Deep. About 840 Europeans and 9,600 natives will be affected by the closing of these two mines.

★A conciliation board, consisting of three representatives of the Gold Producers Committee of the Chamber of Mines, an equal number of members of the Mine Workers Union, and a chair-

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There's a definite reason for this combination of great strength and light weight in Taylor Spiral Pipe. Its spiral seam gives it greater bursting strength, greater collapsing strength, greater longitudinal stiffness than even a seamless pipe of equal wall thickness—makes it the strongest type of pipe of its weight—enables it to handle services like those listed below with strength and service life to spare.

Go over this list and you will find that it represents the big bracket of pipe uses—the every day moderate and low pressure services that are ordinarily assigned to Standard Thickness pipe. And make no mistake about it: Going to Taylor Spiral for such applications can cut the installed cost of piping in many cases to half that of the Standard Thickness pipe it so adequately replaces.

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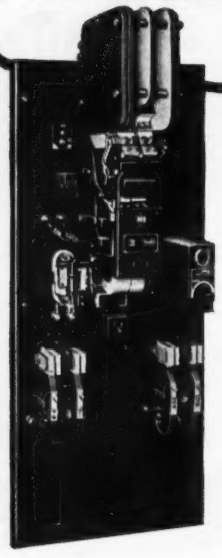

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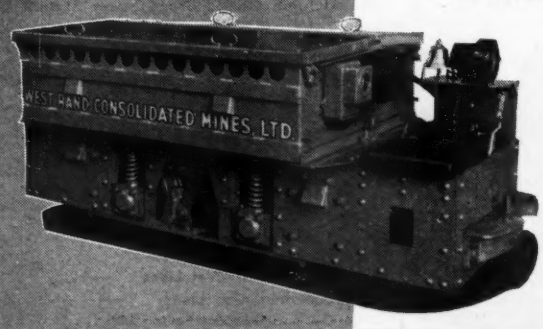

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Africa (*continued*)

man, who is the acting chairman of the Public Service Commission, has been constituted to consider the request for a 30 percent increase in wages for all miners. The chairman has requested all the members of this conciliation board to attend an informal meeting to settle the dispute. Both sides have agreed to accept the decisions of the board. As the difficulty about the composition of the arbitration board has been thus overcome, it is hoped that an amicable agreement will be speedily reached.

★In Southern Rhodesia the mining industry has asked for a commission, which has now been appointed by the government, to enquire into the general conditions of mining and mining taxation. It is hoped to publish the commission's report early next year.

★The mines in the Nigel district belonging to the New Consolidated Goldfields group have decided on an extensive boring program to determine the possibilities of the Kimberley reef in that area. The information will be of immense value in developing this reef, at some future period when times are more propitious. The producing mines concerned are Sub Nigel and Vlakfontein, Spaarwater and West Vlakfontein, though temporarily closed, also participate in the scheme. The remaining mine under the same control in this district, Vogelstruisbult, already has an active development program in operation on the Kimberley reef horizon. Among other mines either developing or working this reef in the Springs Nigel area may be mentioned Springs Mines and East Daggafontein, and Daggafontein.

AUSTRALIA

Kalgoorlie mines face satisfactory postwar future—Search for oil continues in Victoria

WESTERN AUSTRALIA

★Ore reserves in the Kalgoorlie gold mines, and general conditions bearing on continuity of the lodes in depth, as well as the possibility of locating new orebodies at shallower horizons, point to a satisfactory future for the gold field after the war. This view is, of course, qualified by the immediate postwar attitude of labor and the policy toward mining that will be adopted by the present labor government. If the workers expect to live in the Utopia promised them by their leaders, in which they will receive high wages, a high standard of conditions, and perform a minimum of work, and at the same time control the job, the immediate future of the industry would appear far from attractive.

★Estimated ore reserves in eight of the Kalgoorlie mines total 9,000,000 tons, and the average grade lies between

Speaking of Concentration

In metallurgy, concentration is the process by which the values—the concentrates—are segregated from the ore and made available for processing. Hundreds of mills throughout the world entrust that job to AGITAIR.

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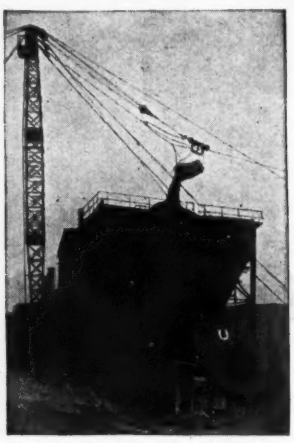

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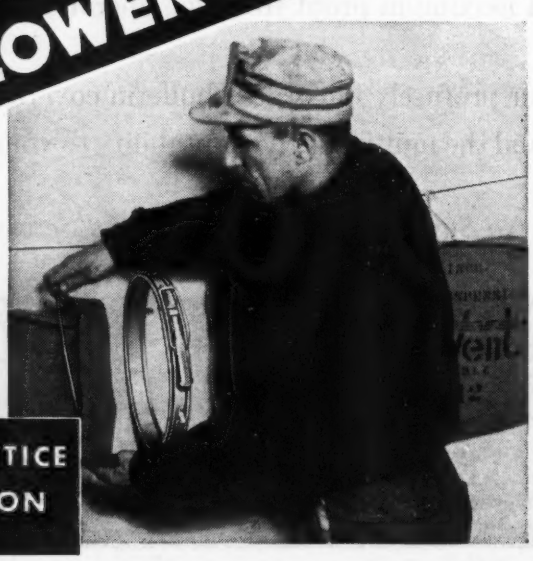

- Acid, water and fungus-resistant
- Easily installed
- Follows every dip, bend or rise
- Light weight, easily handled
- Available in four fabric types.

American BRATTICE CLOTH CORPORATION
WARSAW, INDIANA

Australia (*continued*)

5 dwt. and 6½ dwt. gold per ton. Largest ore reserves are in the Lake View & Star mine and amount to 4,000,000 tons of blocked-out ore. Great Boulder Proprietary Gold Mines, Ltd., which is the adjoining property, has 2,500,000 tons, followed by North Kalgurli (1912) Ltd. with 1,000,000 tons. Reserves in the property of Gold Mines of Kalgoorlie, Ltd., are 550,000 tons; Paringa Mining & Exploration Co., Ltd., has 262,000 tons; Kalgoorlie Enterprise Gold Mines, Ltd., 250,000 tons; Boulder Perseverance, Ltd., 240,760 tons, and South Kalgurli Consolidated, Ltd., 210,000 tons. Although development work has had to be seriously restricted owing to the manpower position, ore reserves have been maintained surprisingly well.

★Outside these operating mines there is a definite development prospect in the Mount Charlotte group of mines, to the north of the Golden Mile, held under option by Wiluna Gold Mines, Ltd. Work here is suspended for the duration of the war, but an extensive diamond-drilling policy by the company owning the leases indicated the existence of more than 1,000,000 tons of ore worth nearly 6 dwt. per ton, above the 1,000-ft. horizon. Paringa Mining & Exploration Co., Ltd., has taken up the Maritana group of leases to the south, and preliminary drilling has shown extensions of the Mount Charlotte lodes, carrying good gold values, at depths of 600 ft. and 800 ft. from surface. In the early years of the field these leases were worked to depths not exceeding 300 ft. and more than one mile of country, in which similar conditions prevail, lies southward to the Croesus Proprietary lease of North Kalgurli (1912), Ltd., and offers a field for further prospecting. Prior to the war, it was the intention of Western Mining Corporation, Ltd., to undertake deep drilling at the southern end of the Golden Mile beyond the Lake View & Star property to test the country lying closer to the great quartz-porphyry mass, the radiating dikes from which have had an important bearing on the mineralization of the lodes.

★Central Norseman Gold Corporation, N.L., is working one of the two important auriferous occurrences at Norseman, 160 miles south of Kalgoorlie. Operations during the last financial year have been subject to the usual handicaps which have hampered the industry throughout the country, but work was less seriously affected than might have been expected, due in some measure to a more settled labor force and a reduction in labor turnover from 87 percent to 64 percent. During the year 73,848 tons of ore and 61 tons of sands produced 27,089 oz. of gold and 19,105 oz. of silver, the average grade recovered being 7.33 dwt. gold and 5.17 dwt. silver. The grade decreased in comparison with the previous year, but was above the average for the mine. Development and exploratory work was limited to 2,050 ft. with 681 ft. of

5 "KVS" answers to your questions about BETTER CRUSHING

Before you put good money into any crusher ask yourself questions about the 5 points below . . . and satisfy yourself you have the right ANSWERS!

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The crushing CAPACITY of "KVS" Gearless Crushers is GREATER, size for size, than any other crusher. The POWER you put into them is not "soaked up" by gears, but goes direct to CRUSHING. They have solid anvil concaves, REVERSED when worn, thus good for months or years added service. Their simplicity and accessibility keep maintenance cost at a low point. And they are EFFICIENT because their size-opening is quickly and simply adjusted . . . shafts are hung on springs to avoid "trampiron" crackups . . . in fact, "KVS" have features found in NO OTHER crushers. That's why so many buyers answer YES to "KVS." WRITE FOR THE "KVS" CATALOG. Each forthcoming advertisement in this series will simplify one of the 5 "KVS" ANSWERS. Catalog gives ALL the facts, quick. Ask for SPECIAL bulletins on mining, cement and pulverized coal equipment.

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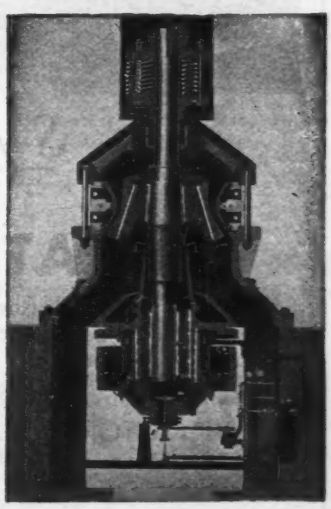

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NO MOTORS—GEARS—NOR OTHER MECHANICAL WEARING PARTS

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SYNTRON CO., 510 Lexington, Homer City, Pa.

Australia (*continued*)

diamond drilling. The proportion of payable footage to the total development footage on reef was 22.1 percent, compared with 15.4 percent in the previous year. The average grade of ore exposed was 12.0 dwt. per ton, which was a slight decrease from the average of 12.7 dwt. in the preceding period. High values, averaging 25.8 dwt., for 129 ft., were disclosed, associated with a drag fold at No. 11 level, and did not extend far to north or south of the fold. At No. 22 level a hanging-wall split has been located, and as it is the normal behavior for new shoots to develop in the hanging wall going north, a new series of oreshoots may be located in this direction. Reserves of proved and probable ore were estimated at 251,000 tons, with an average grade of 7.0 dwt. gold per ton, a decrease of 37,500 tons compared with the previous year. In addition, the Lady Miller mine contained reserves of 21,000 tons assaying 7.2 dwt. per ton. The average tonnage of ore treated per four-weekly period was 5,685 tons, a decrease from the previous average of 6,325 tons. Head value of ore treated was 7.63 dwt. per ton and the assay value of the residues was 0.3 dwt. per ton, equivalent to a recovery of 95.9 percent. The mine is equipped with a diesel-electric power plant, and power cost for the period was 1.092d. per unit on 4,078,720 kw.-hr. generated. Average operating costs per ton were:

	Shillings
Mining, excluding development	26.22
Milling	11.18
Total	37.40

There was a reduction of 0.4s. per ton in mining costs, and an increase in milling costs of 1.03s. per ton, due to increased power cost, lower tonnage treated and a greater amount of maintenance.

NEW SOUTH WALES

★Broken Hill Proprietary Co., Ltd., earned a net profit of £A728,675 in the year ended May 31, 1944, after providing £A1,046,265 for depreciation, £A680,000 for income tax, and £A309,017 for special depreciation on plant and machinery connected with wartime activities. Of the net profit, £A480,636 was derived from trading and £A248,036 from income from investments.

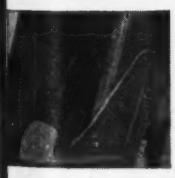
★At the Newcastle steel works, one blast furnace was completely relined and major repairs were made on two furnaces. An additional open-hearth furnace was added and an 18-in. skin pass mill erected at the cold-rolling plant. New sintering equipment for handling flue dust is nearing completion. Owing to difficulties in regard to shipping, iron ore from the mines near Whyalla, South Australia, was supplemented by lower-grade ore from deposits in New South Wales. This has had some effect on production and the position has also been affected by the inadequate supply of suitable labor, causing

★ Bucket Teeth, Lips and Runners
★ Bucket Sides and Bottoms
★ Latch Pins
★ Boom Sockets
★ Track Rollers
★ Track Tumblers
★ Track Pads

Here are important shovel-saving applications for STOODY SELF-HARDENING

BUCKET TEETH AND LIPS

Stoody Self-Hardening is generally applied on teeth and lips as stringer beads. When working in heavy rock or under similar conditions, beads running parallel to the flow of material withstand terrific shock and provide wear resistance comparable to solid deposits.



BUCKET SIDES AND BOTTOMS

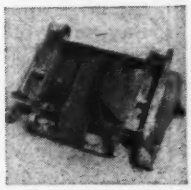
Note the crossed stringer beads forming checkerboard patterns. Areas between beads tend to fill and pack with the material being worked, preventing direct abrasion against metal bottom or sides beneath. Checkerboard patterns are particularly adapted to looser types of formations.

TRACK ROLLERS

A single pass of Stoody Self-Hardening around convex surface of worn track rollers generally restores original size, keeps shovel weight on rollers rather than permitting it to be gradually lowered on driving and idler tumblers. Grinding of rollers after hard-facing is unnecessary.

TRACK TUMBLERS AND IDLERS

If wear is not abnormal, bring lugs to size with Self-Hardening alone. Sufficient accuracy can be attained in size by comparing to unworn sections. Rebuild flat spots on idlers, then hard-face with a single layer of Stoody Self-Hardening.



TRACK PADS

Hard-face leading and trailing edges and inner surfaces of pad lugs with Stoody Self-Hardening, as well as the concave section on which rollers travel. When reassembling, insert new, rebuilt or oversize pins to take up any lengthening of track due to pin wear. This insures accurate mesh between tumbler and pad lugs, and lowers wear.

STOODY SELF-HARDENING, today's number one weapon against wear, is specially suited for hard-facing wearing parts on many types of heavy equipment. Why? Because it forms an excellent bond with manganese steels, provides at least double the wear resistance, yet resists chipping under heavy impact. You'll save your equipment, eliminate down-time and keep things rolling longer by specifying Stoody Self-Hardening for hard-facing wearing shovel parts. More information on earth-working equipment applications is contained in "Stoody Specification Sheets." These describe heavy equipment applications in detail and furnish invaluable information regarding method of application, additional life of hard-faced part and illustrate appearance of correctly applied hard surfacing. Ask for your free copy.

*Stoody Self-Hardening is one of 12 Stoody hard-facing metals especially alloyed to combat abrasive wear with its many variable combinations of heat, impact and corrosion. A booklet covering all Stoody alloys with a non-technical discourse on their individual properties will be mailed free.

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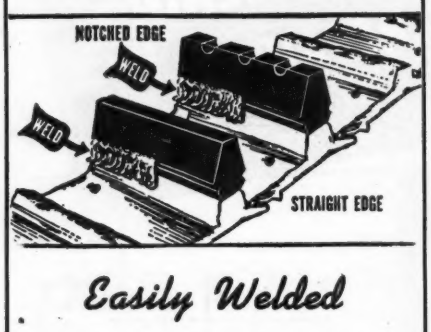

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Australia *(continued)*

much difficulty in maintaining a proper furnace repair cycle.

★The long-continued trouble in the coal fields caused serious depletion in coal stocks, and has resulted in the closing down of the blast furnace at Whyalla, and unless an improvement in the production of coal can be effected, further restriction in operations must result. The company owns its own collieries on the Maitland field and an extensive program of mechanization is being carried out, in connection with which a number of large electric locomotives are being built for underground transport. Much attention has been given to securing the highest possible combustion at the works, and in this connection a coal "washing plant is in course of erection which will improve the quality of the blast" furnace coke. The ferro-alloys plant was operated to full requirement. In the magnesium plant, active production has been suspended, as sufficient stocks are on hand to meet demands.

★On the South Australian side of the operations, some improvement in the shipping position permitted the consignment of an increased tonnage of iron ore from the mines to Newcastle, and to facilitate shipping, a new deep channel has been dredged at Whyalla. The blast furnace at that centre produced foundry iron and ferromanganese until depletion of coke stocks brought about the suspension of smelting. Limestone for the Whyalla works is obtained from the large and modern quarry at Rapid Bay, south of Adelaide, and is conveyed by ship to Whyalla. The company's gold mines in New South Wales and Western Australia remained idle, but the equipment for production at the Yampi Sound iron ore deposits, on the north-west coast of Western Australia, has been commenced.

★It is worthy of note that the Broken Hill Proprietary Co. is one of the great organizations which have proved the backbone of Australian defence and have been most important factors in the country's peacetime advancement and prosperity. This company has produced the world's cheapest steel and has provided the highest standard of conditions for its workers. Its skilled technical organization and financial strength have permitted the immediate commencement of many enterprises for war purposes. Yet this company is attacked as a monopoly, and undesirable, by certain political interests which have reaped maximum benefit and prosperity from its operations.

VICTORIA

★Work continues in a small way in connection with the search for oil. So far, Australia's only potential oil field is at Lakes Entrance, where oil occurs in Tertiary formations, but not in commercial quantity, so far as exploratory work has progressed. Some 30 ft. of oil sand exists at a depth of from 1,200 to 1,400 ft. from surface, and an area of about a square mile has been fairly closely drilled. Oil will flow in small quantity from a thickness of 30 in., but water soon comes in. The field was visited about two years ago by Messrs. Fairbanks and Ranney, and on their advice a shaft is being sunk and horizontal drilling is to be undertaken in the sands to promote the flow of oil.

★The shaft has been sunk to a depth of 740 ft. and has been concreted to 712 ft. Sinking is in marl, and heavy water has been met at several horizons. Messrs. Fairbanks and Ranney regarded the field as a source of good-quality lubricating oil, but not of petroleum, and estimated a production of 1,160,000 bbl. from an area of 400 acres. A later investigation into the character of the oil has indicated a ready response to cracking for production of high-octane gasoline and low-sulphur bunker oil. In addition to the presence of edge water, a problem which has been met in earlier drilling, has been heavy water below the oil sand, with a limestone band about 2 in. thick between the two sands, and in many cases this band has been broken in drilling and the ingress of water ineffectively sealed off. Folding in the oil-bearing area is slight, consisting of a gentle monocline. At Nelson, in the southwest of the State, a deep bore, being put down by the government, has reached a depth of nearly 5,000 ft. in Tertiary beds, and when completed will be the deepest bore drilled for oil in Australia.

CHILE

Cerro Negro mill opened with appropriate ceremonies—Braden reported damaged by snowslides

★The Cerro Negro mill, in central Chile, was started recently with special ceremonies in which the President of Chile, Senor Juan Antonio Rios, participated. The occasion was appropriate for official recognition because it marked the undertaking of a large mining enterprise by local capital.

Cerro Negro ore is a fine-grained, fairly compact breccia of bluish color, well cut by fissures. Copper minerals are finely disseminated through the rock and consist of bornite, chalcocite, malachite, covellite, chalcopyrite, and azurite. The orebody was tested by pits sunk at intervals of 50 meters, proving 500,000 metric tons of ore running 3.3 percent copper. The orebody lends itself to open-cut mining, although some parts must be mined by underground methods. At the mill, which is connected with the mine by a 3-kilometer aerial tramway, the ore is crushed, ground, and concentrated by flotation. Power is obtained over a 16-mile, 44,000-volt transmission line from the Chagres substation of Cia. Chilena de Electricidad. The concentrates are to be smelted at Chagres in a plant owned by Compagnie Miniere du M'Zaita, which is developing the

Chile (*continued*)

Cerrado mine and putting up a 120-ton flotation mill.

★The worst snowfall known at the property of the Braden Copper Co. since operations began in 1905 occurred this winter. Heavy accumulations of snow caused some really terrible snowslides at the main camp at Sewell, where the mill is located. Many of the snowslides reached the camp, completely destroying several houses where employees and their families were housed. Braden officials have acquired skill in dealing with snowslides through 40 years' experience in what is without doubt the most rugged topography of the region in which the world's porphyry coppers are found. However, although aid was swift and efficient and no efforts were spared to save those not killed outright by the slides, when the roll was called more than 100 men, women, and children had been killed. Damage to property, which was heavy, has not yet been made public, but copper production was cut to less than half. Some of the steel bridges that span the ravines to carry the tailings down to the dump at Cauquenes were destroyed.

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of Engineering and Mining Journal, published monthly at York, Pennsylvania, for October 1, 1944.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. A. Gerardi, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of Engineering & Mining Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the name and address of the publisher, editor managing editor, and business managers is: Publisher, McGraw-Hill Publishing Company, Inc., Editor, Evan Just; Managing Editor, Allan Hubbell; Business Manager, A. M. Buehle; all of 330 West 42nd St., N. Y. C. 18.

2. That the owner is: McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York City. Stockholders holding 1 % or more of stock: James H. McGraw; James H. McGraw, Jr.; James H. McGraw, Jr., Curtis W. McGraw and Edwin S. Wilsey, Trustees for: H. W. McGraw, J. H. McGraw, Jr., D. C. McGraw, C. W. McGraw; Curtis W. McGraw, Donald C. McGraw; all of 330 West 42nd Street, New York City; Edwin S. Wilsey and Curtis W. McGraw, Trustees for J. H. McGraw, 3rd, Madison, New Jersey; Mildred W. McGraw, Madison, New Jersey; Wilson C. Laucks, Spruce and Canal Sts., Reading, Pa.; Grace W. Mehren, 73 No. Country Club Dr., Phoenix, Ariz.: Margaret Stump, 1418 Rose Virginia Rd., Wyomissing Park, Reading, Pa.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him

J. A. GERARDI, Secretary.

McGRAW-HILL PUBLISHING COMPANY, INC.

Sworn to and subscribed before me this 28th day of September, 1944.

SEAL ELVA G. MASLIN.

(My commission expires March 30, 1946.)

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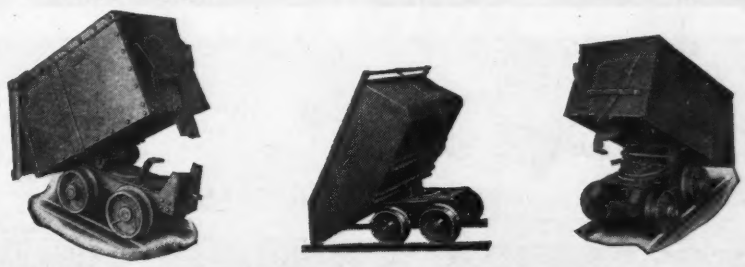

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Washington Reflections

(*Continued from page* 95)

Arsenic Needs May Help Marginal Mines

Arsenic's wartime importance to agriculture for use in insecticides now that pyrethrum and rotenone have gone to war in the South Pacific, and the increased demand for arsenic by the glass industry and for other war requirements, have led to interesting questions as to the future of the metal and its possible impact on the operation of marginal metal producers in this country. It has been suggested that if it became necessary to close down some of the marginal producers of copper, lead, and zinc they might receive another lease on life because of the amount of arsenic that they produce. One reason advanced for this idea is the limited life remaining to the Gold Hill operations. However, this basis for support will evaporate when trade with Sweden is resumed, as that country has an arsenic stockpile that will take care of any needs as soon as the shipping lanes are open.

Two WPB Mineral Divisions Consolidated

Consolidation of WPB's Mica-Graphite Division and Miscellaneous Minerals Division, which has been rumored for some months, finally took place at the beginning of November. The change was timed to coincide with the change in the top personnel of the Mica Graphite organization. M. H. Billings, who has been the head of the Mica-Graphite Division, left Washington on Nov. 2 to take a new position in private industry.

The new chief of what is now known as the Mica-Graphite Branch is Frank F. Watts. Mr. Watts recently returned from India, where he has been employed by the Joint Mica Mission, the joint purchasing group for the United Nations.

James S. MacGregor continues as chief of the Miscellaneous Minerals Division, which has absorbed the Mica-Graphite Division. Mr. Watts is deputy director. This consolidation is in line with WPB policy to bring divisions together wherever possible to cut administrative expense. Still other changes are in the wind and may even be announced this month.

Drop in Price of Gold

Declining prices for gold on the Egyptian and Indian markets are interpreted by Washington and London authorities as reflecting prospects for an early victory for the United Nations. Further fluctuations are expected between now and the end of hostilities. In Washington the decline was seen as likely to thwart the efforts of Senators Scrugham and others from mining states to have Congress permit the export sales of domestically mined gold and silver.

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In making Bethlehem Superior, melts are held to the most exacting chemical and metallurgical specifications. Carbon range lies between 0.75 and 0.85.

A proper balance of grain size is achieved throughout. This eliminates the possibility of too many large or too many small cleavage planes. As a result, there is no direct line of cleavage to encourage failures.

Rolling temperatures are rigidly controlled from start to finish, assuring correct hardness for maximum shock- and fatigue-resistance.

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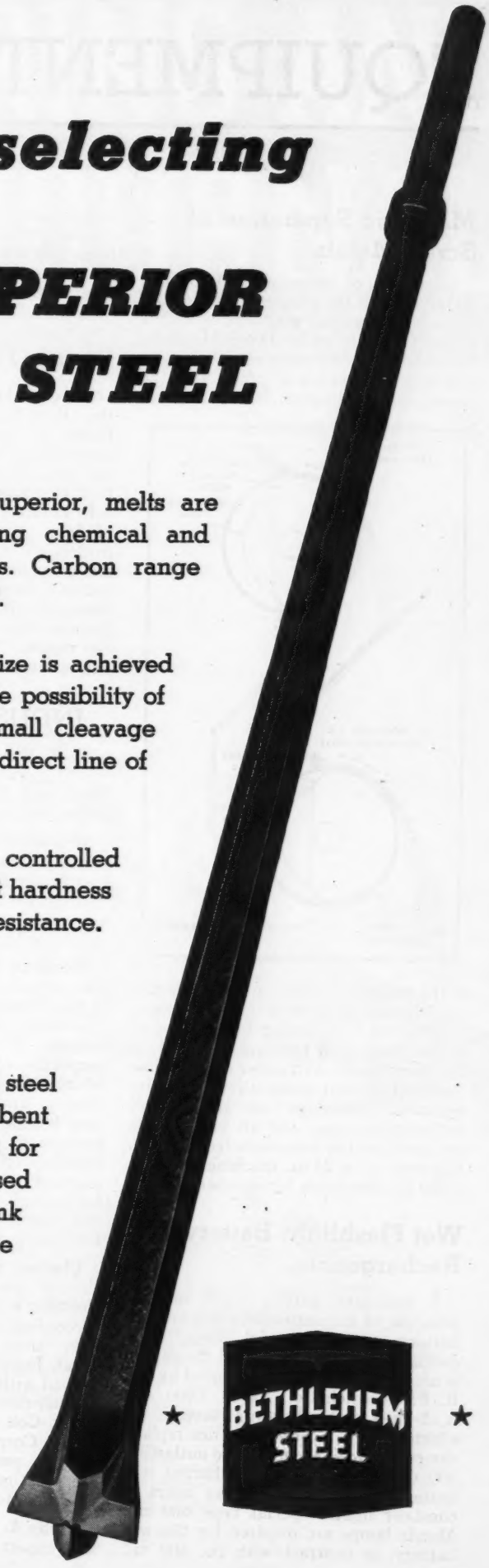
In Bethlehem Superior, you get a drill steel that is tough, resilient, and shock-absorbent . . . a fatigue-resisting steel that is ideal for both forged-on bits and fabricated rods used with detachable bits . . . a steel whose shank end withstands the punishing blows of the drill piston.

It's an old favorite with mining men, quarry men, and contractors. Next time you order hollow drill steel, specify Bethlehem Superior.

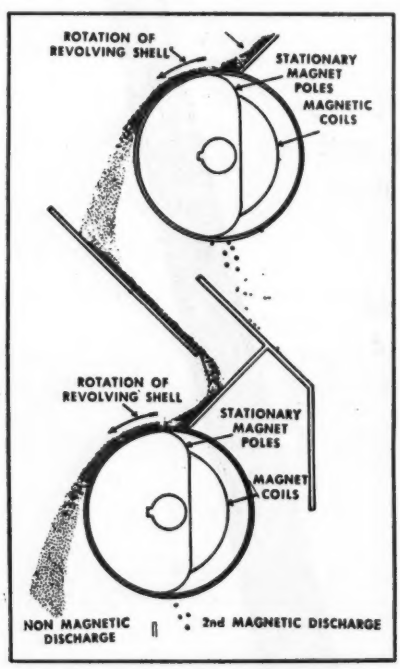


★ BETHLEHEM STEEL ★

EQUIPMENT NEWS

Magnetic Separation of Scrap Metals

Separation of ferrous and non-ferrous metal scrap is the purpose of a double-drum, high-intensity magnetic separator recently announced by Dings Magnetic Separator Co., Milwaukee 7, Wis. The principle of operation is indicated in the accompanying diagram. New features



of the machine include high-temperature windings on the coils, which are capable of withstanding flaming hot aluminum chips. Outboard bearings are used on the drum shafts, and either drum can be removed without dismantling the entire separator. Bearings are dust-sealed, anti-friction type, and all vital points are lubricated by a pressure feed system. Capacity of a 24-in. machine is about 5,000 lb. aluminum borings per hour.

Wet Flashlight Battery Is Rechargeable

A flashlight battery built on the principle of the automobile wet storage battery, specially useful where long-continued and steady use of flashlights is necessary, has been announced by the B. F. Goodrich Co., Akron, Ohio. It is claimed that substantial savings are effected when the wet batteries replace dry cells, one of the new type outlasting 400 dry cells. A freshly charged wet battery will give about three hours of constant light. Special type 600 mil Mazda lamps are required for the wet battery, in contrast with the 300 mil lamps used in dry batteries. The company sells recharging equipment and tester with the batteries, on which it gives a six months' guarantee of replacement if failure is not due to abuse or misuse.

Visible Flow Meter

Developed on the rotameter principle, the Rota-Sight flow rate meter of Fisher & Porter Co., Hatboro, Pa., shows when liquid is passing through the line, and, in addition, has an indicating float that moves up and down the pyrex tube in direct proportion to the amount of flow. If audible as well as visible protection is desired, the alarm float has a magnetic extension that trips an external magnetic switch to operate the alarm circuit. Alarm positions are adjustable over the entire flow range of the meter. The metering tube is only 3x6 in. over all.

INDUSTRIAL NOTES

A. F. Sprankle has been appointed metallurgical engineer in the **Timken Steel and Tube Division of Timken Roller Bearing Co.,** Canton, Ohio.

Howard C. Sauer is in charge of the newly created foreign division of **Timken Roller Bearing Co.,** handling sales and service of all the company's products in the world market. His office will be in Canton, Ohio.

Nordberg Mfg. Co., Milwaukee, Wis., has acquired the controlling interest in the **Northern Processing Mchy. Co.,** Cleveland, Ohio, which will hereafter operate as a subsidiary under the corporate name of **Nordberg Process Mchy. Co.** The Nordberg line of mining and milling machinery will now be augmented by the addition of processing machinery used in the chemical, clay, cement, alumina, and pigment industries; also equipment for calcining, sintering, and smelting, and the production of crushed stone, sand, and gravel.

Charles Roebling Tyson has been elected president of the **John A. Roebling's Sons Co.,** Trenton, N. J., succeeding the late William A. Anderson. Also announced is the election of **Lieut. Joseph M. Roebling,** now serving abroad with the U. S. Army Air Corps, as chairman of the board of directors. **Lieut. Col. F. W. Roebling III,** U. S. Army Corps of Engineers, continues as vice president. All three officials are great-grandsons of John Augustus Roebling, founder of the company.

Philip A. Ray, metallurgist and flotation expert for **Hercules Powder Co., Wilmington, Del.,** has been transferred to Denver, Colo., where all future technical service for flotation plants and naval stores products will be centered for Colorado, Utah, New Mexico, Arizona, and Montana.

G. B. Livingood, advertising manager of the Traylor Engineering & Mfg. Co., Allentown, Pa., and editor of "The Traylorian," died on Oct. 9.

BULLETINS

Magnets and Magnetic Separators. Stearns Magnetic Mfg. Co., Milwaukee 4, Wis., has issued Bulletins 35-A on lifting magnets; 81-A on magnetic separators particularly applicable to the mining field; and 701-A on separators of the gravity and deflector design useful for material of reluctant magnetic qualities or difficult separation.

Metallizing Accessories. Catalog and price list of Metallizing Co. of America, Chicago 7, Ill.

Dust Explosion Prevention. National Fire Protection Association, Boston, Mass., has published the 1944 edition of "National Fire Codes for the Prevention of Dust Explosion," including the 15 standard American codes and a new code for plants producing or handling magnesium powder.

Control Instruments. Wheelco Instruments Co., Chicago 7, Ill., has published new bulletins describing its control devices, as follows: No. J602-2 on Throttltrol, valve-positioning device; J403-2 on Inputrol, electric timing device; and J303-2 on Rheotrol, to maintain power or heat input or flow of fluids.

Trucks for Mining. Mack Trucks, Inc., New York, N. Y., has issued an illustrated booklet on its Model FC six-wheel truck for open-pit mining.

Speed Reducers. Winfield H. Smith, Inc., Springville, N. Y., has issued a 92-page catalog and engineering manual, No. 144.

Selenium Rectifiers. Fansteel Metallurgical Corp., Rectifier Division, North Chicago, Ill. Bulletin RDP-105; 12 pages.

Seamless Tube Data Book. Seamless Steel Tube Institute, Pittsburgh 19, Pa. Pp. 320, 8½ × 11 in., loose-leaf binder. Price $2.50. In four sections with guide index, covering general data, mechanical tubing, pressure tubing, and reference tables. The most complete volume on the subject issued for many years. Supplementary sheets with new data will be supplied from time to time.

Diesel Engines. Worthington Pump & Machinery Co., Harrison, N. J. Bull. S-500-B35A on Type BB vertical four-cycle, direct-injection engines.

Pneumatic Materials Handling. Bull. 744. Allen-Sherman-Hoff Co., Philadelphia 2, Pa.

Fleet-Welding. A 48-page booklet published by Lincoln Electric Co., Cleveland, Ohio.

Electric Unit Heaters. Bull. 44-U. Electric Air Heater Co., Mishawaka, Ind.

Air Compressors. A 12-page booklet by Schramm Inc., West Chester, Pa.

Rust Preventive. A bulletin on Tectyl products, chemical protective coatings for metals. Valvoline Oil Co., Cincinnati, Ohio.

Pulp Density Scales. For determining specific gravity of pulps and liquids. Bull. S1C-B. Denver Equipment Co., Denver 17, Colo.

Reconditioned Machinery. Bull. 441, Morse Bros. Mchy. Co., Denver 1, Colo. Pp. 36.

Bit Dressers. 24-page Bull. BD-2 of Bucyrus-Erie Co., South Milwaukee, Wis. No. 12 for bits up to 12 in. diameter, and No. 8 for bits up to 6¼ in. diameter.

Plasti-Goggle. Eastern Equipment Co., Inc., Willow Grove, Pa., has issued catalog section AWP-30 showing a new one-piece goggle of clear Plexiglas.

Pneumatic Sponge Pumps. Bull. 44-7035 of Byron Jackson Co., Los Angeles 54, Calif.

Meters. Bull. 349 of Builders-Providence, Inc., Providence, R. I., describes Shuntflo meters for steam, air, or gas.